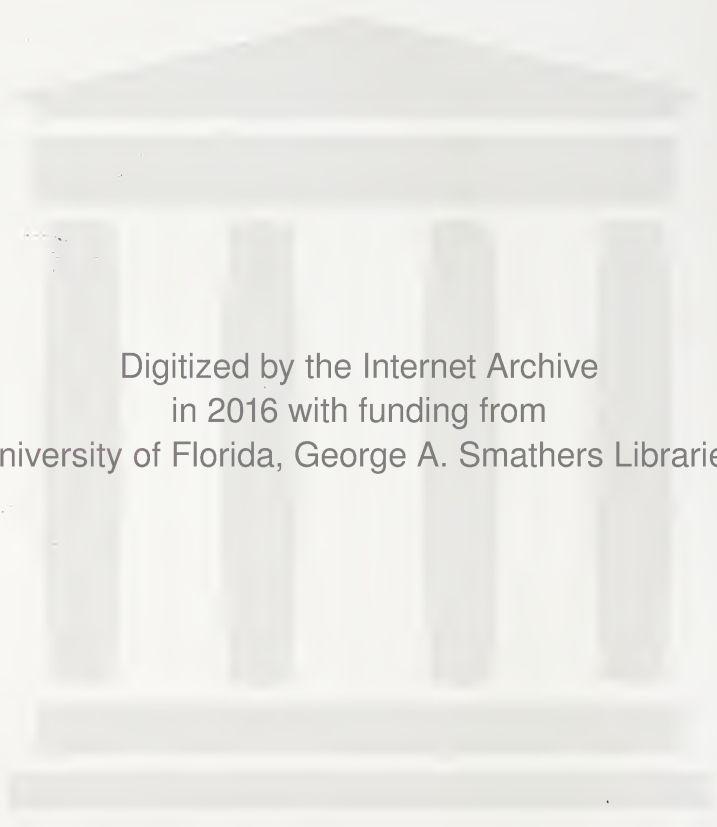


D 208.107: 968-69

# UNITED STATES NAVAL ACADEMY CATALOGUE 1968-1969



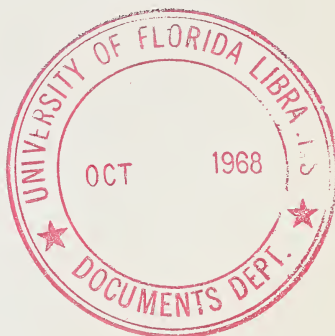
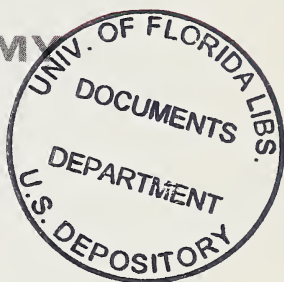


Digitized by the Internet Archive  
in 2016 with funding from  
University of Florida, George A. Smathers Libraries



**FLARE**

**UNITED STATES  
NAVAL ACADEMY  
CATALOGUE  
1968-1969**



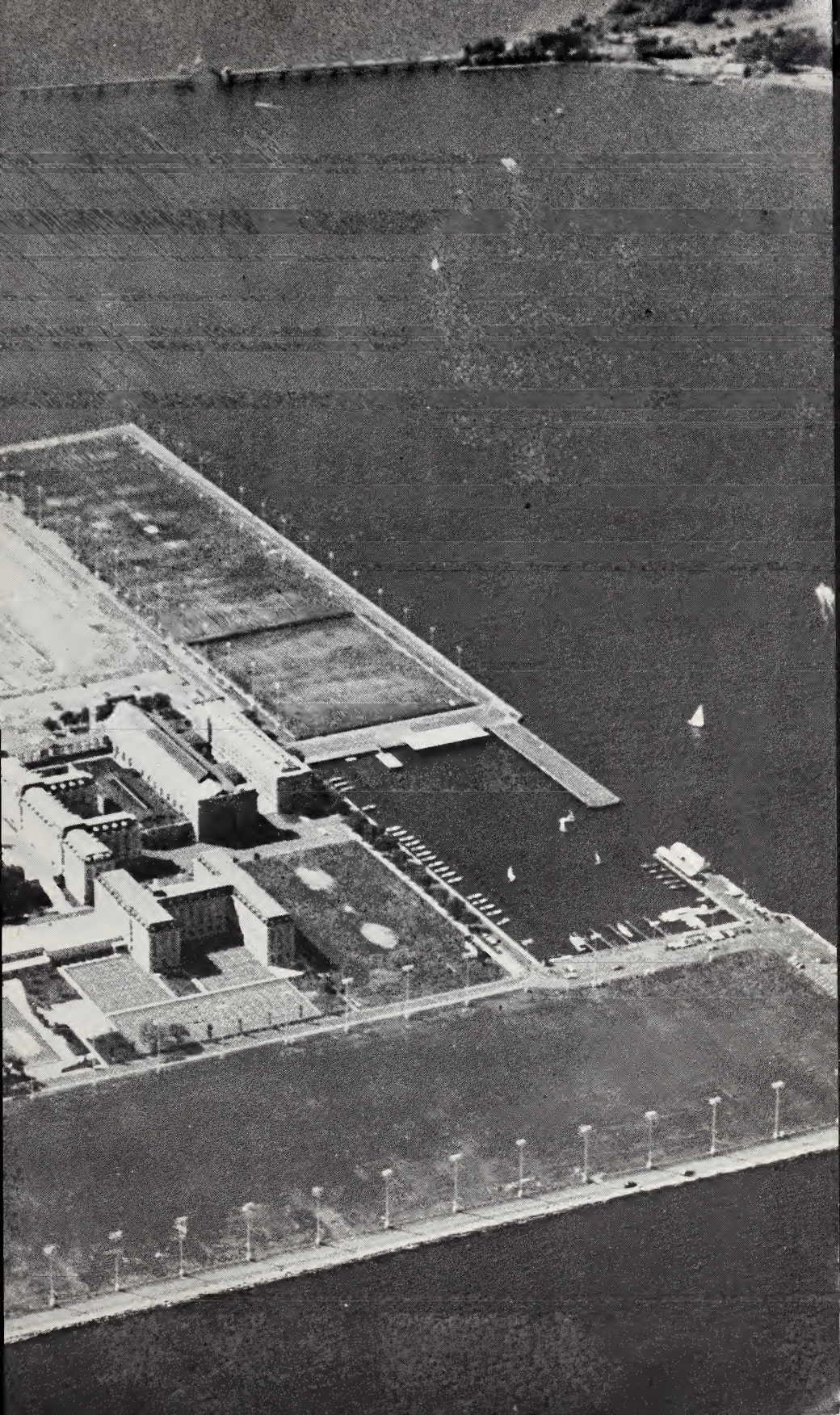
**MISSION**

To develop midshipmen morally, mentally and physically and to imbue them with the highest ideals of duty, honor and loyalty in order to provide graduates who are dedicated to a career of Naval Service and have potential for future development in mind and character to assume the highest responsibilities of command, citizenship and government.

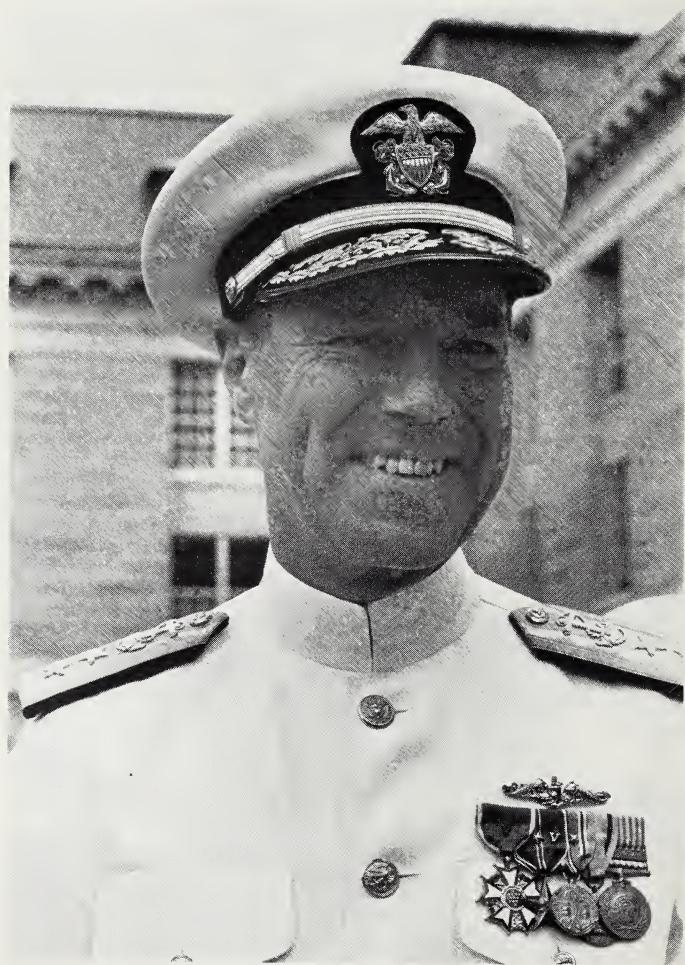














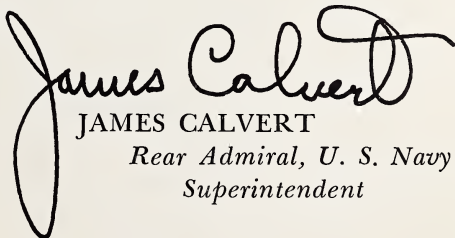
*Gentlemen:*

*The Naval Academy exists for the purpose of educating and training young men to be officers in our Navy and Marine Corps.*

*The education provided by the Academy grows in scope and sophistication each year as the tasks and technology of the Naval Service become ever more complex. However, the training side of our mission remains much the same as it has been since the Academy was founded—the inculcation of those ideals of duty, honor, and courage essential to the proper leadership of men in the defense of our Nation.*

*The Naval Academy is the first step in a career which can lead to positions and responsibilities of national importance. Men like Ernest King, Chester Nimitz, and Raymond Spruance started their careers at Annapolis. The leaders of our Naval Service today are graduates of this institution—and it is to the young men who are entering it now that the Navy of the 1980's and 1990's will look for its top leadership. The challenge is an exciting one.*

*The Naval Academy is four years filled with hard academic work, demanding routine, and constant accountability but, when it is all added up, I think it represents one of the richest and most beneficial experiences open to the youth of America today.*



JAMES CALVERT  
Rear Admiral, U. S. Navy  
Superintendent

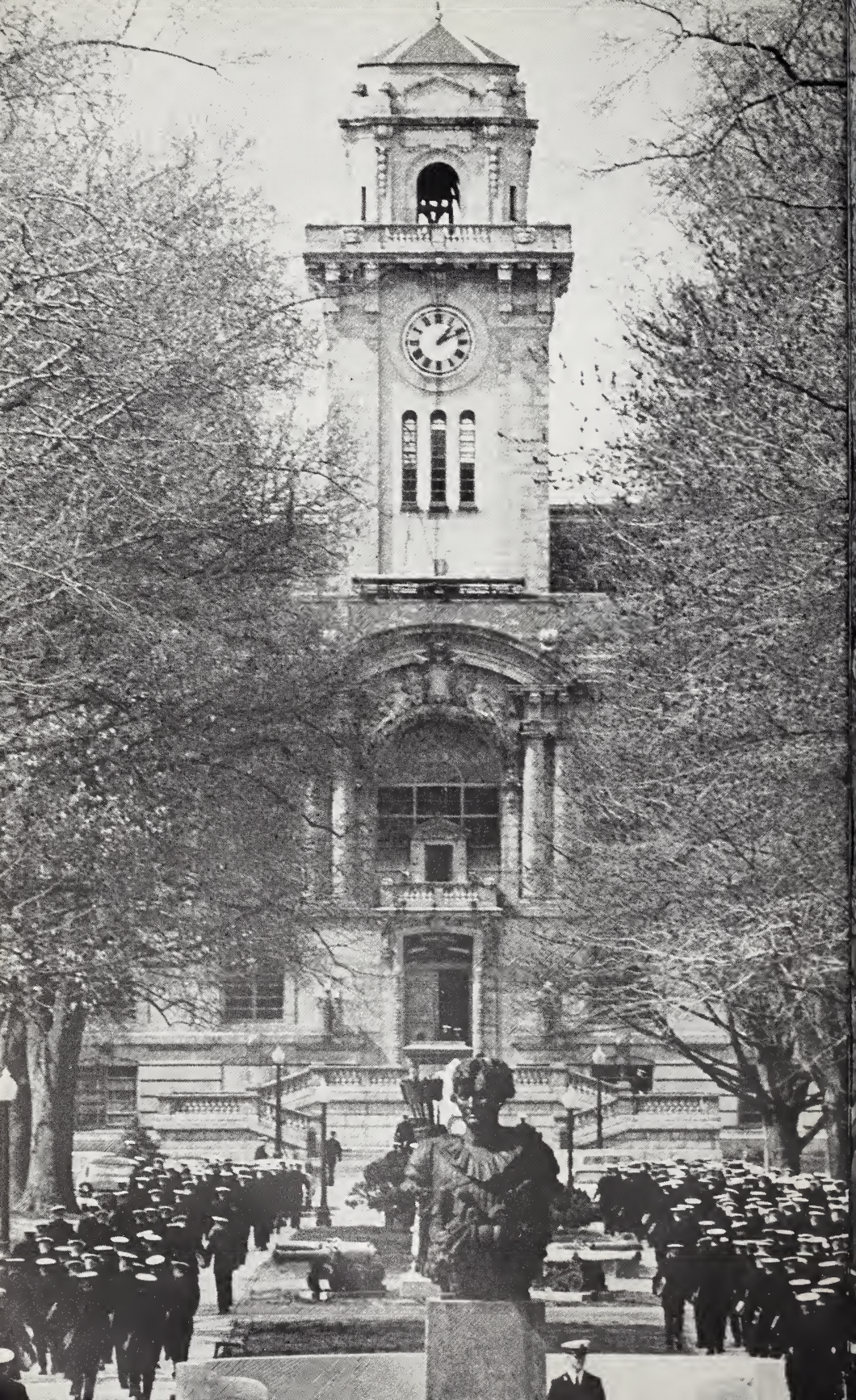
# CONTENTS

1	THE NAVAL ACADEMY
1	Through the Years, 1845–1968
4	Recent Curriculum Changes
5	Facilities
9	HOW TO BECOME A MIDSHIPMAN
9	General Eligibility Requirements
10	Obtaining a Nomination
16	Formats for Requesting Nominations
19	Scholastic Requirements
24	Medical Qualification
31	Medical Examining Centers
34	Progress Reports on Qualifications
34	Early Notification of Admission
34	Entrance Information and Procedures
41	Service Obligation of Midshipmen
42	Agreement Signed by Midshipmen
42	Policies Regarding Disenrollment
43	Foreign Students
45	Preparatory Scholarships
46	The U.S. Naval Preparatory School
47	Important Dates for Candidates
49	THE NAVAL OFFICER'S CAREER
50	First Duty
50	Career Patterns
54	Education and Training
59	THE ACADEMIC PROGRAM
59	The Basic and Core Curriculums, Minor and Major
62	The Academic Organization
62	The Faculty
65	The Schedule of Instruction
65	Grading
67	The Advanced Placement Program
68	The Minors and Majors Program
69	Requirements for Bachelor of Science Degree
70	Trident Scholars
71	The Evening Lecture Program
71	Immediate Graduate Education Programs
72	Naval Academy Foreign Affairs Conference
73	The Invitational Debate Tournament
73	The Library
74	The Academic Computing Center
79	THE MILITARY AND PROFESSIONAL PROGRAM
79	The Commandant of Midshipmen
79	The Executive Department

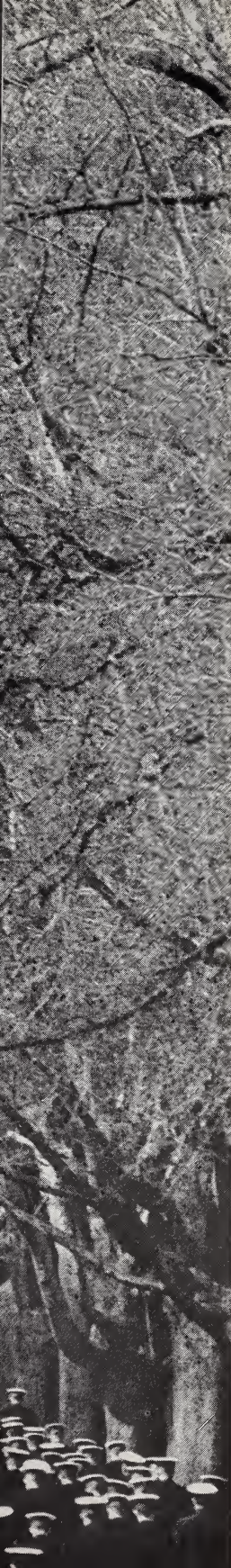


80	The Brigade and the Military Program
80	The Honor Concept
83	Plebe Indoctrination
85	Weekly Routine
86	The Development of Leaders
91	The Professional Training Program
92	Leave and Privileges
93	Physical Education
95	Medical and Dental Care
95	Bancroft Hall
97	RELIGIOUS ACTIVITIES
100	LIFE OF A MIDSHIPMAN—A PICTORIAL
105	DEPARTMENTS AND PROGRAMS
106	Engineering Department
122	English, History, and Government Department
140	Mathematics Department
148	Modern Languages Department
159	Naval Science Department
171	Science Department
188	Weapons Department
197	PROFESSIONAL TRAINING
202	The Physical Education Department
205	THE ATHLETIC PROGRAM
206	Intercollegiate Athletics
211	Intramural Sports
211	The Naval Academy Athletic Association
213	THE EXTRACURRICULAR PROGRAM
215	SAILING
219	THE YP SQUADRON
221	ADMINISTRATION
221	The Board of Visitors
223	The Academic Advisory Board
225	STAFF AND FACULTY
258	PRIZES AND AWARDS
258	THE MUSEUM
260	NAVAL ACADEMY ALUMNI ASSOCIATION
261	UNITED STATES NAVAL INSTITUTE
262	CALENDAR
263	INDEX









## The Naval Academy

The U.S. Naval Academy is the undergraduate college of the U.S. Navy. Its purpose is to educate and train young men for careers as officers in the Naval Service. The Academy is accredited by the Middle States Association of Colleges and Secondary Schools. Graduates of its 4-year course are awarded the Bachelor of Science degree and are commissioned Ensigns in the U.S. Navy or Second Lieutenants in the U.S. Marine Corps.

Located at the mouth of the Severn River on Chesapeake Bay in Annapolis, historic Colonial capital of Maryland, the Academy is 30 miles east of Washington, D.C., and 25 miles south of Baltimore. Visitors are welcome during daylight hours. Information and a map of the Academy are available at the entrance gates.

### THROUGH THE YEARS, 1845-1968

As the Nation's responsibilities and need for seapower have grown through the years, the Navy has increased greatly in size and complexity. Keeping pace, in peace and war, from sail to steam, and into the nuclear age,

the Naval Academy has responded to every challenge, expanding its facilities and revising its curriculum as necessary to provide the timely second-to-none leadership expected of the American Navy.

The Naval Academy was founded as the Naval School in 1845 by the Honorable George Bancroft, distinguished historian and educator and Secretary of the Navy in President Polk's Cabinet. Its site, Fort Severn, was obtained from the War Department. The first Superintendent was Commander Franklin Buchanan. His seven-member faculty of four officers and three civilians taught gunnery, naval tactics, engineering, chemistry, mathematics, astronomy, French, and English. Sixty midshipmen, formed in two classes, attended the Academy's first convocation.

Prior to 1845, the majority of a midshipman's training was conducted aboard ship under the ship's chaplain. Supplementary training was provided from time to time at various schools ashore. These included a short-lived school in the Washington Navy Yard, established in 1803, and a Naval School established in Philadelphia in 1839 to provide an 8-month preparatory course for midshipmen's promotion examinations.

Initially the course was 5 years. Of these, only the first and last were spent at the new Naval School in Annapolis. The intervening three were spent at sea. In 1850-51 the Naval School was reorganized as the U.S. Naval Academy and the course of study became 4 consecutive years. Summer practice cruises replaced the omitted sea service. Thus, today's basic 4-year curriculum first appeared at the Naval Academy over 100 years ago, long before it became general practice in American undergraduate education.

The Board of Visitors first met at the Academy in 1851. During the Civil War the Academy was moved temporarily to Newport, R.I. Following the war it was returned to Annapolis, where it has since remained. During these early years the Academy was unique in American educational experience in that it was one of the few institutions offering a sophisticated undergraduate course in technical education. In 1879 this excellence was recognized by the Paris Exposition in the form of a certificate for "The Best System of Education in the United States."

In the late 1870's Albert A. Michelson, a graduate of the Class of 1873, performed his world-famous experimental measurement of the velocity of light while serving as an instructor in the Department of Physics and Chemistry at the Academy. Michelson continued his brilliant scientific work after leaving the Navy, and in 1907 he

became the first American scientist to receive a Nobel Prize. The supreme compliment was paid by Albert Einstein who once noted that the inspiration for his theory of relativity came directly from Michelson's work. Thus, it comes as no surprise to note that the name selected for the science wing of the Academy's just-completed science and mathematics building is Michelson Hall.

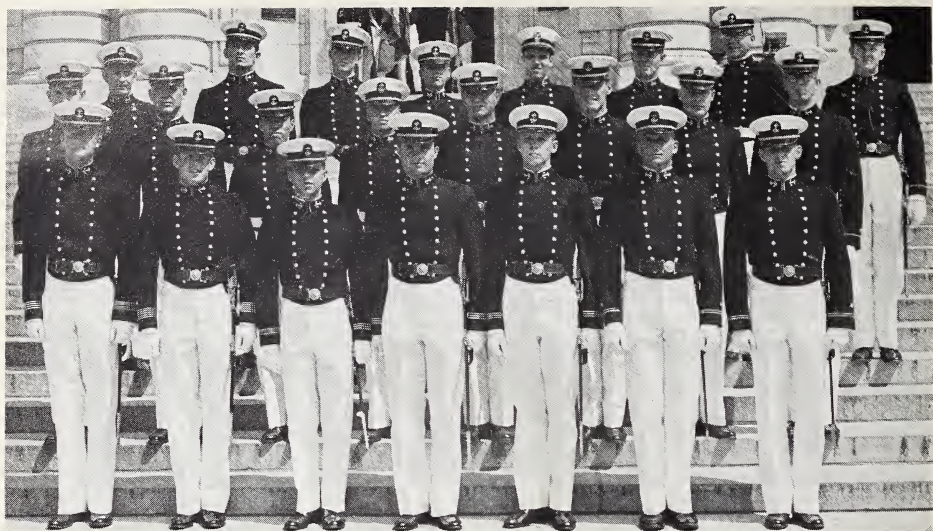
Other distinguished graduates have included Mahan, whose profound writing on seapower and its influence on history is still the world standard in its field, and an uninterrupted succession of distinguished military leaders going back through peace and war for over 100 years. Admirals Dewey, Sims, King, Nimitz, Halsey, Burke, and Rickover need no introduction. Neither do astronaut Shephard and Gemini 6 and 7 astronauts Schirra, Lovell, and Stafford. The successors and heirs to their greatness are midshipmen today.

From 1873 to 1912 the academic course was 6 years, with the last 2 being spent at sea. In 1912 the requirement for 2 years at sea was eliminated and the curriculum reverted to 4 years. With the exception of temporarily shortened curriculums during the war years, it has remained 4 years until today.

Following accreditation of the Naval Academy in 1930 by the Association of American Universities, a 1933 congressional law was passed authorizing the Academy to confer the Bachelor of Science degree upon all graduates, beginning with the Class of 1931. Subsequently, in 1939, Congress authorized the award of the B.S. degree to all living graduates. The Middle States Association of Colleges and Secondary Schools first accredited the Academy in 1947. And, in 1958, the tests of the College Entrance Examination Board replaced Academy-prepared entrance examinations.

In 1964 the Academy's Ph.D. Program was instituted under which highly qualified midshipmen may be selected to go directly to graduate studies leading to a Ph.D. degree. Other programs initiated in recent years include nuclear power training and a number of graduate programs. The most recent, initiated in the fall of 1966, is the Immediate Master's Program under which qualified midshipmen may be selected to enroll in accelerated master's programs immediately after graduation at participating universities or at the Naval Postgraduate School. Also, in 1966, an Academic Advisory Board of distinguished Americans was appointed by the Secretary





*Scholarship award winners*

of the Navy to advise the Superintendent on academic matters. The Board meets triannually.

Highlighted by a record 6 Rhodes Scholarships in 1930, midshipmen have won an impressive number of academic honors through the years. Two of the 10 Churchill Scholarships awarded in the U. S. in 1966 were awarded to Academy graduates. In all, midshipmen of the Class of 1968 were awarded 29 top scholarships, including 1 Rhodes, 5 Atomic Energy Commission, 1 National Science Foundation, 8 Guggenheim, 10 Burke, 1 Daedalian, and 3 awarded by Catholic University. Eighty-one Immediate Master's were awarded.

The Naval Academy's debate team has had a consistently fine record in recent years. Highlight was a national ranking of fourth in 1964. During the most recently completed season, the team participated in 30 tournaments, winning 19 awards.

Midshipmen have displayed an active and growing interest in the study of international affairs. Last spring, 160 students from more than 100 schools attended the Academy's eighth annual Foreign Affairs Conference. High State Department officials as well as ambassadors and representatives from 20 embassies took part.

## RECENT CURRICULUM CHANGES

The rush of science and technology in recent years has spurred revolutionary changes in the Navy and in the Academy's curriculum. Discussed in greater detail on succeeding pages, these changes began



in 1959 with provision for incoming midshipmen to validate previous college-level work. Concurrently with validation, there was a broadening of course offerings and qualified midshipmen were encouraged to carry more than the minimum number of courses.

This was followed in 1963 by the appointment of a civilian Academic Dean (*pro tem*); the initiation of the Trident Scholar program, under which a small number of exceptional students are permitted to pursue independent research during their First Class (senior) Year; and the conversion of the Academy's traditional 4.0-based marking system to the more widely used letter-grade system.

The 1964–65 Academic Year saw the establishment of the civilian line positions of Academic Dean and Dean of Admissions under the Superintendent. Academic departments were placed directly under the Academic Dean. Far-reaching changes made in the curriculum at this time followed logically the provisions for validation, electives, and “overloads” initiated in 1959.

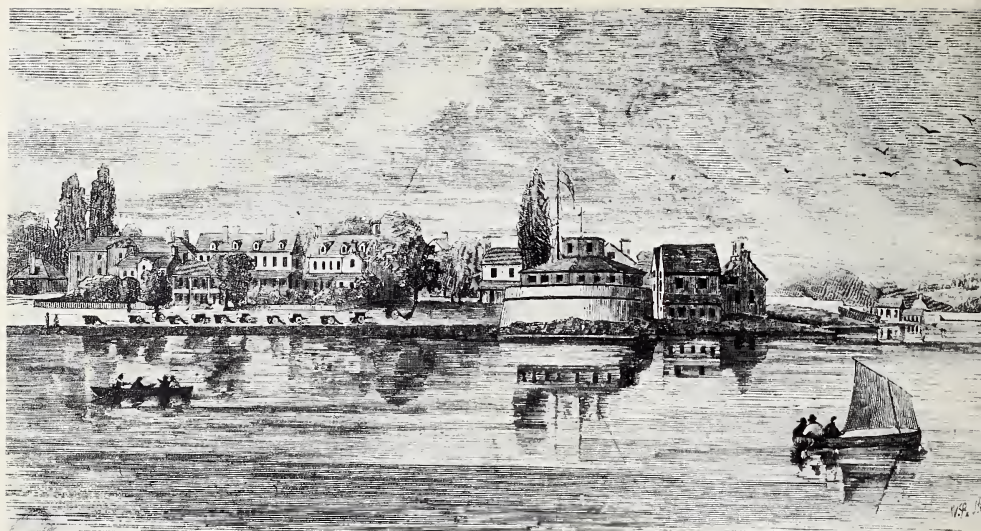
The Academy's traditionally uniform basic curriculum gave way to a flexible curriculum of core courses and an elected six-course minor. Twenty-three minors and 21 (now 23) majors were offered. Study in greater depth was facilitated by a reduction in formal course requirements and by an increase in the number and depth of elective courses offered. The Class of 1968 was the first to enter the Academy under this new program.

Most recently, in the fall of 1967, the basic curriculum was strengthened by the addition of certain core courses in the military-professional area. The majority of this additional work is scheduled during the summer.

Increasing numbers of midshipmen have taken advantage of the flexibility offered by the Academy's validation and elective programs to pursue advanced undergraduate study. Reflecting this trend, members of the Classes of 1969, 1970, and 1971 validated 1423, 1644, and 1875 courses, respectively. Similarly, members of the last three classes to graduate have, in turn, fulfillment requirements for 209, 412, and 437 majors.

## FACILITIES

Physical and academic facilities have kept pace with the demands of the curriculum and the Fleet. Fort Severn's original 10 acres have grown to today's 302 acres. Much of this increase has resulted from a series of landfills in the Severn River. The most recent landfill, completed in 1959, added 56 acres for athletic fields and



Naval Academy 1853 and 1908. Michelson and Chauvenet Halls, completed 1968.



new buildings. Construction of buildings in the present French Renaissance style began in 1899 with a congressional appropriation of \$10 million. The renowned Ernest Flagg was the architect.

Recent years have seen the addition of new wings to Bancroft Hall, the midshipmen's dormitory; the construction of a new Brigade Library and Assembly Hall; the construction of a new athletic field house, large enough to accommodate the entire 4,000-man Brigade of Midshipmen with families and friends of First Classmen (seniors) when used at graduation; and the construction, with privately donated funds, of the nearby Navy-Marine Corps Memorial Stadium. A complete multimillion-dollar renovation of six of Bancroft Hall's eight wings was completed in 1965.

Currently, a \$73-million construction and rehabilitation plan is underway. Key structures in this plan are the new science building, Michelson Hall and, adjoining, a new mathematics building, Chauvenet Hall. Both were completed in the summer of 1968. A new engineering building and laboratory complex, a new 750,000-volume library, and a new 2,500-seat multi-purpose auditorium are included in building plans for fiscal 1970 and 1973. Extensive facilities and educational services for student and faculty research, computer-aided education, and educational television are included. All academic areas will be air-conditioned.

The center of midshipman activity in today's Yard is Bancroft Hall, the largest and surely one of the most beautiful dormitories in the world. Stretching over many acres, and so large that it must be viewed from the air to be seen in its entirety, it houses the entire Brigade as well as providing facilities for recreation and basic daily needs.

Sharing the spotlight in the Yard is the tall, beautiful, and familiar Chapel dome, beneath which lies the crypt of America's renowned Revolutionary War hero, John Paul Jones. Throughout the Yard stand other monuments and mementos commemorating great men and deeds of our Navy and perpetuating its traditions.











# How to Become a Midshipman

## CANDIDATES FOR ADMISSION MUST

- Meet general eligibility requirements
- Obtain a nomination
- Qualify scholastically
- Qualify medically

## GENERAL ELIGIBILITY REQUIREMENTS

### CITIZENSHIP

All candidates for admission to the U.S. Naval Academy must be male citizens of the United States, except as provided by law for limited numbers of citizens of other American Republics and the Philippine Republic.

### AGE

Candidates must be at least 17 and not have passed their 22d birthday on 1 July of the year of admission.

### MARRIAGE

Candidates must never have been married. Any midshipman who marries will be discharged from the Academy.

### MORAL CHARACTER

Candidates must be of good moral character.

## OBTAINING A NOMINATION

### GENERAL

U.S. citizens are appointed to the Naval Academy without regard to race, creed, or national origin. It is necessary for a young man to obtain a nomination in order to be considered for appointment. The sources of nominations are described below. The applicant should study the various sources carefully to determine those through which he is eligible to apply. Results of the College Entrance Examination Board tests, taken for purposes of qualifying for the Naval Academy, apply to all nominations a candidate may hold.

### TYPES AND SOURCES OF NOMINATIONS

**Congressional.** Each Senator, each Representative, and the Resident Commissioner of Puerto Rico individually may have a maximum of five midshipmen attending the Naval Academy at any one time. The applicant should address his request directly to the official concerned. Eligibility for congressional nominations is restricted by law to the two Senators from an individual's home state and to the Representative of the congressional district in which he lives. A sample letter of application is included on page 16.

**Vice Presidential.** The Vice President may have a maximum of five midshipmen attending the Naval Academy at any one time. He may nominate candidates from the United States at large. A letter requesting nomination should be addressed directly to the Vice President. It should contain the same information required of a congressional applicant.

**District of Columbia.** The Commissioner of the District of Columbia may have a maximum of five midshipmen attending the Naval Academy at any one time. Applications should be made directly to the Commissioner. A letter requesting nomination should contain the same information required of a congressional applicant.

**The Governors of Puerto Rico and the Canal Zone** may each have one midshipman attending the Naval Academy at any one time.

**The Governors of the Virgin Islands, Guam, and American Samoa** may, collectively, have one midshipman attending the Naval Academy at any one time. Applications to these nominating authorities should contain the same information required of congressional applicants.



**Presidential.** The President may appoint 100 midshipmen each year. These appointments are limited by law to sons and adopted sons of officers and enlisted personnel, Regular or Reserve, of the Army, Navy, Air Force, Marine Corps, or Coast Guard who either (1) are on active duty (other than for training) and have served continuously on active duty for at least 8 years, or (2) are retired, or who die while they were retired with pay or granted retired or retainer pay, other than those granted retired pay under Section 1331 of Title 10, USG.<sup>1</sup>

A person who is eligible for selection in the Sons of Deceased/Disabled Veterans category is not eligible in the Presidential category.

Adopted sons must have been adopted prior to their 15th birthday. The Secretary of the Navy is authorized to approve waivers of this policy where adoption proceedings had been initiated but the adoption had not occurred prior to the 15th birthday through circumstances beyond the control of the foster parents. Stepsons are not eligible. Applications should be addressed to the Chief of Naval Personnel, Department of the Navy, Washington, D.C. 20370. A sample letter of application is included on page 17.

**Regular Navy and Marine Corps.** The Secretary of the Navy may appoint 85 enlisted men of the Regular Navy and Marine Corps to the Naval Academy each year. These men must meet all of the entrance requirements and may not have passed their 21st birthday as of 1 July of the year of entrance to the Naval Academy. Applicants must have enlisted in the Navy or Marine Corps prior to 1 July of the year preceding the desired year of entrance to the Naval Academy. Applicants from the Regular Navy and Marine Corps normally attend the U.S. Naval Preparatory School in order to compete for these appointments. Since the selection of candidates for this school begins in the spring, enlisted men who fulfill the age and service requirements are encouraged to make their desires known to their commanding officers as early in the year as possible.

**Naval Reserve and Marine Corps Reserve.** The Secretary of the Navy may appoint 85 enlisted men of the Naval Reserve and Marine Corps Reserve each year. These men must be qualified as to age and must have enlisted in the Reserve prior to 1 July

<sup>1</sup> Retirement under this law provides for retirement at age 60 for combined active and inactive service of at least 20 years.

of the year preceding the year of entrance to the Naval Academy. In addition to all other normal requirements for appointment, these men must be on active duty, or must be members of a drilling unit of the Reserve, be recommended by their commanding officers, and have maintained efficiency in drill attendance with their Reserve units. The Naval Preparatory School has a limited number of openings available each year for applicants from the Reserve.

Midshipmen USNR of the Regular NROTC Program and members of the Aviation Cadet Program are *not* eligible for appointment under this quota.

For further information about enlistment in the Naval Reserve or Marine Corps Reserve, applicants should apply to their nearest Naval or Marine Corps Reserve Training Center or Naval Recruiting Station.

**Sons of Deceased or Disabled Veterans.** The President may have a maximum of 40 midshipmen who are sons of deceased or disabled veterans attending the Naval Academy at any one time.

Eligibility for nomination under this quota is limited to sons of members of the Armed Forces of the United States who were killed in action or died of, or have a service-connected disability rated at not less than 100 per centum resulting from, wounds or injuries received or diseases contracted in, or preexisting injury or disease aggravated by active service.

The determination of the Veteran's Administration as to service connection of the cause of death or percentage of disability is binding upon the Secretary of the Navy. A sample letter of application is included on page 18.

**Honor Naval and Military Schools.** The Secretary of the Navy may appoint annually 10 honor graduates of educational institutions designated as "honor schools" by the Department of the Army, Navy, and Air Force. Each honor school may nominate three honor graduates to compete for these appointments. Included in the three may be students who are expected to be honor graduates in June of the year of admission to the Academy. However, these nominees will not be considered for appointment unless they subsequently fulfill the requirements enabling them to be honor graduates at the time of their graduation. Eligible students should apply to the heads of their schools for nomination.

**Naval Reserve Officers' Training Corps.** The Secretary of the Navy may appoint 10 midshipmen annually from among members of the Naval Reserve Officers' Training Corps. Three candidates





*Candidate discussing his qualifications with the Dean of Admissions.*

may be nominated each year by the Professor of Naval Science of each educational institution in which an NROTC unit is established. Each candidate must have completed 1 year of scholastic work in the Corps at the time of entrance to the Naval Academy.

**Sons of Medal of Honor Winners.** The sons of persons awarded the Medal of Honor may be appointed, provided they are in all other respects qualified. No recommendation or endorsement from any source is required. Applications for these appointments should be addressed to the Chief of Naval Personnel, Navy Department, Washington, D.C. 20370.

#### QUALIFIED ALTERNATES AND COMPETITORS

**General.** The Secretary of the Navy is authorized to appoint 150 qualified congressional alternates. These appointments are awarded to the best-qualified alternates as recommended by the Academic Board of the Naval Academy.

Additional appointments from qualified alternates and competitors may be made by the Secretary to bring the Brigade of Midshipmen to its authorized strength. If these additional appointments are necessary, at least 75 percent must be selected from congressional nominees. The remainder may be made from noncongressional sources. The qualifications of all qualified alternate and competitive candidates will be carefully evaluated. No special application for these appointments by the individual is necessary or desired.

#### FOREIGN STUDENTS

**Republic of the Philippines.** On behalf of the President of the United States, the Secretary of the Navy is authorized to permit up to four Filipinos at a time to receive instruction at the Naval Academy. Applications for these appointments must be addressed through diplomatic channels. The appointments are on a competitive basis.

**American Republics other than the United States.** Upon designation by the President of the United States, the Secretary of the Navy is authorized to permit up to 20 persons at a time from foreign American Republics to receive instruction at the U.S. Naval Academy. Not more than three persons from any one country may receive instruction at the same time. Applications for these appointments must be addressed through appropriate diplomatic channels. The appointments are on a competitive basis.

#### NOMINATING METHODS

**Congressional.** Members of Congress may nominate by either of the following methods:

- **Principal-Alternate Method**

The Congressman may nominate one principal candidate and nine alternate candidates listed in order of his preference. If the principal candidate meets the eligibility criteria and qualifies on the entrance examinations, he will be offered the appointment. If he does not, the next designated alternate candidate who qualifies will be chosen.

- **Competitive Method**

The Congressman may nominate a maximum of ten competitors for each vacancy. In evaluating these candidates for the Congressman, the Academy analyzes the "whole man," assigning



appropriate weighted values to several factors, including examination scores, previous academic work, extracurricular activity, participation in sports, the holding of class office, and the recommendations of principals and teachers. The candidate with the best whole man composite score is offered the appointment.

**Other Categories.** The choice between the Principal-Alternate and Competitive Methods is also available to the District Commissioner and the Governors of Puerto Rico and the Canal Zone. The Governors of the Virgin Islands, Guam, and American Samoa must nominate by the Competitive Method in selecting the nominee for their one common appointment.

*Candidates are selected for appointment on a strictly competitive basis from nominees entered in the several service-connected categories:* Presidential, Sons of Deceased or Disabled Veterans, Regular and Reserve Components, Honor Military and Naval Schools, and NROTC. Factors considered in evaluating these nominees are the same as those discussed in the Competitive Method "whole man" analysis used for the evaluation of congressional candidates. There is no limit on the number of eligible candidates who may compete in the Presidential, Sons of Deceased or Disabled Veterans, or Regular and Reserve categories.

**Nominating Schedule.** A candidate is advised to apply early for nomination. If seeking a congressional nomination, it is particularly important to apply early, *preferably during the spring of the junior year in high school*. Senators and Representatives may submit the names of their nominees any time between 1 July 1968 and 31 January 1969 for the class entering in June 1969. A majority of them will make their selections for nominations early in this period. It is, of course, too late to apply once the Congressman has selected his quota of nominees.

In any case, all nominations from all sources must be received by 31 January 1969 for the class entering in June 1969.

**Civil Service Commission Examinations for Congressional Nominations.** Some Congressmen and other authorized nominators utilize competitive examinations of the U.S. Civil Service Commission to assist them in evaluating and selecting their candidates. These special competitive examinations do not determine the candidate's scholastic qualifications for admission to the Naval Academy. The Naval Academy requirements must still be met fully.

## REQUESTING A CONGRESSIONAL NOMINATION

Date \_\_\_\_\_

Honorable \_\_\_\_\_

Honorable \_\_\_\_\_

House of Representatives OR United States Senate

Washington, D.C. 20515 Washington, D.C. 20510

Dear Mr. \_\_\_\_\_:

Dear Senator \_\_\_\_\_:

It is my desire to attend the United States Naval Academy and to make the United States Navy my career. I respectfully request that I be considered as one of your nominees for the class that enters the Academy in June 1969.

The following personal data are furnished for your information:

Name: (As recorded on birth certificate)

Address: (City, County, State)

Name of Parents:

Date of Birth:

High School Attended:

Date of High School Graduation:

Approximate Grade Average:

My high school transcript of work completed to date is attached.

I have been active in the high school extracurricular activities described on the attached list.

I shall greatly appreciate your consideration of my request for a nomination to the U.S. Naval Academy.

Sincerely yours,  
Signature



## REQUESTING A PRESIDENTIAL NOMINATION

Date

Chief of Naval Personnel  
Department of the Navy  
Washington, D.C. 20370  
ATTN: Pers-B66

Dear Sir:

I request a nomination under the Presidential category for the class that enters the Naval Academy in June 1969 and submit the following information:

Name: (Give name as shown on birth certificate. If different from that which you use, attach a copy of court order, if applicable)

Address: (Give permanent and temporary address)

Date of Birth: (Spell out month)

Date of High School Graduation:

If Member of Military: (List rank, serial number, component, branch of service, and organizational address)

If Previous Candidate: (List year)

*Information on Parent:*

Name, Rank, Serial Number, Component, and Branch of Service:

Organizational Address:

Retired or Deceased: (Give date and attach copy of retirement orders or casualty report)

Officer Personnel: (Attach statement of service prepared by personnel officer specifying that officer is on active duty and has been on active duty for at least eight years)

Enlisted Personnel: (Attach statement by personnel officer listing dates of enlistment and expiration of enlistment, component and branch of service, and specifying that member is on active duty and has been on active duty for at least eight years)

Sincerely yours,  
Signature

REQUESTING SON OF DECEASED/DISABLED  
VETERAN NOMINATION

Date

Chief of Naval Personnel  
Department of the Navy  
Washington, D.C. 20370  
ATTN: Pers-B66

Dear Sir:

I request a nomination under the Sons of Deceased/Disabled Veterans category for the class that enters the Naval Academy in June 1969 and submit the following:

Name: (Give name as shown on birth certificate. If different from that which you use, attach a copy of court order, if applicable)

Address: (Give permanent and temporary address)

Date of Birth: (Spell out month)

Date of High School Graduation:

If Member of Military: (List rank, serial number, component, branch of service, and organizational address)

If Previous Candidate: (List year)

*Information on Parent:*

Name, Rank, Serial Number, Component and Branch of Service:

If Parent is Deceased:

Date, Place, and Cause of Death:

Veterans Administration Claim Number: (Forwarding a copy of death certificate, preferably the casualty report, will expedite processing of application)

Address of VA Office where case is filed:

If Parent is 100% Disabled:

Veterans Administration Claim Number, and copy of retirement order or other documentary evidence showing 100% service-connected disability:

Address of VA Office where case is filed:

Sincerely yours,  
Signature



## SCHOLASTIC REQUIREMENTS

A candidate's previous academic record and his performance on specified College Entrance Examination Board tests are the factors used to determine scholastic qualification for admission. The results of any College Board test taken to qualify for the Naval Academy are applicable to all nominations which a candidate may hold. Acceptable test dates are noted on the pages following.

There are two methods of qualifying scholastically for admission to the Naval Academy: the Examination Method and the College Certificate Method. These two methods are described on succeeding pages.

## SUBMISSION OF SCHOLASTIC RECORDS

Each candidate is responsible for ensuring the submission of detailed records of his completed high school, preparatory school, and college work and lists of any current or proposed courses. The official college transcript should be used for submitting college records.

Official forms for submitting high school records will be provided by the Navy Department following receipt of the nomination from the Member of Congress or other authorized appointment source. These certificates should be filled out and submitted to the Naval Academy by the school or schools as soon as practicable after receipt. It is important to each candidate that records be supplied promptly and that previous school records include academic marks and class standing or estimated class standing through the first semester of the final year. In the event that class standing for the end of the junior year is the latest available, it will be acceptable. Recommendations from the candidate's high school principal, teachers, extracurricular advisers, and coaches should be furnished on the forms provided. These records and recommendations are considered in conjunction with the College Entrance Examination Board tests in order to establish the relative priority of qualified candidates in the various competitive lists and for the purpose of selection under the qualified alternate law. They must be received not later than 15 March, 1969.

It must be appreciated that, except for qualified congressional principals and qualified sons of Medal of Honor holders (who receive outright appointments), all candidates who have succeeded in qualifying scholastically, medically, and physically must be evaluated and arranged in order of precedence. The method utilized

by the Academy to determine the relative merit of these qualified candidates is the "whole man" analytical process described previously under the Competitive Method on page 14.

Once candidates have been fully evaluated and assigned an appropriate numerical selection score, and their names placed on a master list in order of their scores, their relative positions on the list do not change. Thus the single master list serves to determine a candidate's relative position on any competitive list for which he is eligible.

**Acceptable Scholastic Record.** Each candidate must present an acceptable secondary school certificate from an accredited secondary school, or its equivalent, including at least 15 units of credit in college-preparatory subjects and indicating ability to do college-level work successfully. While not an absolute requirement, standing in the top 40 percent of one's high school class is of great importance in determining qualification for admission. (The great majority of midshipmen come from the top 20 percent of their high school classes.) Candidates should, insofar as is practicable, include as many as possible of the following studies in their secondary school programs:

- At least 3 years but preferably 4 years of mathematics, including advanced algebra, geometry, and trigonometry.
- Four years of English.
- Two years of a foreign language, preferably modern.
- One year of chemistry.
- One year of physics.

It is expected that the secondary school official will recommend only those candidates who, in his opinion, have excellent character and the scholastic background needed to pursue a difficult course of college level in which the emphasis is placed on engineering subjects as well as the humanities.

Deficiencies in the secondary school certificate can often be offset by offering acceptable college work. Conversely, evidence of inability to do acceptable college work can be cause for disqualification.

**Examination Method.** The basic method of qualifying is by presenting an acceptable secondary school certificate and by scoring acceptably in the following College Entrance Examination Board tests:

- Scholastic Aptitude Test (Verbal)



- Scholastic Aptitude Test (Mathematics)
- Achievement Test in English Composition
- Achievement Test in Mathematics, Level I (Standard)  
or Level II (Intensive)

It is the candidate's responsibility to insure that he takes these required tests. No substitutes will be considered in qualifying for entrance to the U.S. Naval Academy. Candidates are encouraged to choose the mathematics achievement test on which they feel they can attain the higher score. Level I is recommended for candidates without advanced high school mathematics. No additional weight is given to the results of the test in Level II Mathematics over those in Level I Mathematics.

Tests must be taken during the school year preceding admission on one or more of the following regular College Board testing dates:

- Saturday, 2 November 1968 (SAT only)
- Saturday, 7 December 1968 (SAT and Achievement Tests)
- Saturday, 11 January 1969 (SAT and Achievement Tests)
- Saturday, 1 March 1969 (SAT and Achievement Tests)

Basic qualifying scores in the College Entrance Examination Board tests for any class will be determined by the Academic Board of the Naval Academy. No candidate will be admitted to the Naval Academy unless in the opinion of the Academic Board he shows the requisite scholastic qualifications.

Each candidate is responsible for registering with the College Entrance Examination Board for the tests. The Naval Academy will accept scores from the November (1968), December (1968), January (1969), and March (1969) administrations only, *and will credit a candidate with the highest scores achieved.* The candidate, however, must insure that the Naval Academy receives the results from each test taken during the current school year. He should indicate at the time he registers for the test that he wishes the scores furnished to the Naval Academy or, in the event he did not so indicate, he should write to the College Entrance Examination Board and request that his scores be forwarded to the Naval Academy.

Candidates must pay for their own College Entrance Examination Board tests. A candidate who is unable to pay for such tests should promptly advise the College Board so that special arrangements may be made.

General information on the tests, including dates of administration, location of testing center, dates by which candidates must

register, method of application, fees, etc., is published in a booklet entitled *Bulletin of Information*. This booklet, published annually by the College Board, may be obtained without charge by writing to:

The College Entrance Examination Board at

Post Office Box 592

Princeton, N.J. 08540

or

Box 1025

Berkeley, Calif. 94701

In addition to the above-mentioned *Bulletin*, the College Board publishes two booklets, one entitled *A Description of the College Board Scholastic Aptitude Tests* and one titled *A Description of the College Board Achievement Tests*. Supplies of these two booklets are provided by the College Board to all high schools. Candidates may obtain the booklets from their high schools or may write to the College Board for individual copies free of charge.

For the majority of candidates, the examining points are in the communities in which they live. It is expected that few, if any, candidates will have to travel more than 75 miles.

Duly nominated candidates who have registered for and are unable to complete the prescribed College Entrance Examination Board tests on or before the 1 March administration because of sickness, injury, weather, or other extenuating circumstances should promptly advise the Chief of Naval Personnel.

**College Certificate Method.** A candidate who holds a nomination as a Congressional, District of Columbia, or Vice Presidential principal or alternate, or who is seeking admission as the son of a Medal of Honor winner, may fulfill the scholastic requirements for admission by submitting an acceptable secondary school certificate and an acceptable college certificate. He is also required to take the College Entrance Examination Board tests specified above for the information of the Naval Academy.

A candidate competing under any source of nomination other than those outlined in the previous paragraph *must* qualify by the Examination Method; this includes all Congressional candidates nominated by the Competitive Method. All candidates planning to use the College Certificate Method should advise the Dean of Admissions, U.S. Naval Academy, of their intent to do so *prior* to March 15, 1969.

An acceptable college certificate is one attesting at least 1 year's attendance at an accredited junior college, college, university, or technical institution of college grade during which the candidate





*Candidates enter from every state.*

completed courses totaling at least 24 semester hours of credit for subjects acceptable to the Naval Academy with grades substantially better than the college minimum passing grade. Six semester hours must be in pure mathematics, such as college algebra, trigonometry, analytical geometry, calculus, etc., and six semester hours must be in English or history, or a combination thereof. The remaining credits necessary to complete the certificate may be offered from a wide range of college liberal arts or engineering subjects. The overall quality of the college record must be acceptable to the Naval Academy.

The length of college attendance prescribed is defined as requiring actual full-time attendance for one regular school year during which the candidate pursues courses constituting a normal year's load.

A candidate who contemplates qualifying by the College Certificate Method, but who has not completed the required year of

college at the time of receipt of his nomination, should have his high school record and a preliminary college record submitted showing the courses contemplated or in progress and the amount of credit in semester hours to be assigned for each course. A form for submitting the high school record will be provided by the Navy Department. The official transcript form of the college should be used for submitting the college record. An early review by the Naval Academy of the record of completed work and of courses proposed for completion may reveal defects which can be corrected by slight changes in the final semester schedule. Following this review, the Naval Academy will forward a letter suggesting any steps which the candidate should take. If in doubt, a candidate should address a letter to the Dean of Admissions, U.S. Naval Academy, Annapolis, Md., 21402.

**Qualifying in Previous Year.** Former midshipmen who have successfully completed the first year of the Naval Academy's course need not requalify scholastically for admission, but they must demonstrate to the satisfaction of the Academic Board that they are qualified for readmission. All other former candidates must requalify scholastically and medically for the class to which they seek admission.

## MEDICAL QUALIFICATION

Candidates are required to be physically fit, well-formed, and of sound constitution. The medical requirements are exacting, thus protecting the best interests of the Government, the Navy, and the individual.

All candidates are encouraged to undergo thorough private medical and dental examinations using the special medical examination considerations set forth herein (see page 27) as a guide in determining their medical and dental conditions before pursuing nomination and before taking the Qualifying Medical Examination. This will serve to identify obviously disqualified applicants as well as those who may have remediable defects. Defects must be corrected at the candidate's expense. The candidates who are obviously disqualified will benefit themselves and the U.S. Government by not pursuing candidacies further.

## QUALIFYING MEDICAL AND PHYSICAL APTITUDE EXAMINATIONS

The Chief of Naval Personnel, Navy Department, Washington, D.C. 20370, will send an authorization designating the time and



place of Qualifying Medical Examination to each duly *nominated* candidate. In addition, members of Congress may arrange physicals for applicants seeking to qualify for nomination.

Qualifying Medical Examinations are conducted at more than 200 authorized Medical Examining Centers of the Army, Navy, and Air Force located throughout the United States and overseas. (See page 31 for a listing of these Centers.) The Medical Examinations are standardized, and results are accepted by each of the three services, regardless of which service has conducted the examination. Examinations are conducted starting on 1 July of the year preceding admission.

The Qualifying Medical Examination includes a separate Physical Aptitude Examination. The Physical Aptitude Examination varies from service to service and may vary from year to year, but basically, for all services, it includes sit-ups, pull-ups, push-ups, arm-hang, squat-walk, and related exercises. Tests given at Air Force and Army Examining Centers include evaluation of other areas. Examinations conducted by the other services are accepted by the Navy. Candidates reporting for examination should take sun glasses for use after eye examinations and shorts and athletic supporter for use during the Physical Aptitude Examination.

At Naval Examining Centers, the Physical Aptitude Examination is given in conjunction with all Qualifying Medical Examinations. It may be necessary to schedule Physical Aptitude Examinations separately for candidates examined at Army and Air Force Centers.

Candidates ordered to report for Medical and Physical Aptitude Examinations, who are unable to report at the time scheduled, or who are injured or ill, or who, for any reason, are unable to comply with instructions to report for Medical and Physical Aptitude Examinations, must communicate with the Chief of Naval Personnel and the designated examining center to explain the circumstances before further examination will be authorized.

Candidates having orthodontic appliances in place are not required to have them removed prior to reporting for Qualifying Medical Examination. Candidates who have undergone major surgery involving knee, shoulder, or spine will not be scheduled for examination until 6 months have elapsed following surgery. Medical and Physical Aptitude Examinations will terminate on 15 March 1969. Injury and surgical cases will not be considered thereafter.

While candidates may be scheduled for Medical and Physical Aptitude Examinations at Army, Navy, or Air Force facilities, the majority of Naval Academy candidates will be scheduled for examination at Naval medical examining facilities. Candidates are expected to report prior to 7:00 a.m. on the day of examination except as may be otherwise directed in reporting orders. Normally, candidates examined at Naval medical examining facilities will be required to spend 1 day under examination. Candidates ordered to Army and Air Force Examining Centers will be required to spend 2 days to complete examinations.

Candidates are required to pay their own transportation, meals, berthing, and related expenses in connection with these examinations. *Generally, only one Medical and Physical Aptitude Examination will be authorized for each candidate.*

Qualifying Medical Examinations of candidates for the Academy receive prompt review by the Naval Academy's Permanent Board of Medical Examiners. Each nominated candidate is notified of the finding in his case by the Bureau of Naval Personnel. Candidates are advised to notify the Permanent Board at the Academy of any subsequent change in their physical condition requiring hospitalization or the service of a physician subsequent to their Qualifying Examination. Candidates reporting to the Academy for appointment as midshipmen with disqualifying medical defects will not be enrolled.

#### REVIEW AND WAIVER PROCEDURE

The results of all medical examinations of candidates for the Naval Academy are subject to review by the Permanent Board of Medical Examiners, U.S. Naval Academy. Medical qualification decisions made by that Board are final. In this respect, where the disqualifying defect is subject to medical or dental correction, the candidate may be conditionally rejected subject to later certification by a physician or dentist that the defect has been corrected with complete restoration of function. Such certification must reach the Permanent Board of Medical Examiners as soon as possible and not later than 15 March in any case. Final reports of applicants certified by that Board will be forwarded to the Chief of Naval Personnel and to the Academic Board, U.S. Naval Academy. *The Academic Board may grant waiver of a very minor defect to a candidate who is outstanding in all other respects.*

Since waiver action is predicated upon the overall quality of a candidate's record, it is important that transcripts of secondary



school or college work, the report of extracurricular activities, and the required letters of recommendation be submitted as soon as possible. In some instances it will be necessary to delay evaluation of a record until results of the March College Board tests have been received. *It is emphasized that review and waiver procedures are automatic for all candidates who are found not medically qualified because of minor medical defects upon formal Qualifying Medical Examination and that queries regarding the status of waiver action will only delay final determination.* Reexamination of those candidates who fail the medical examination can be approved only by the Chief of Naval Personnel. Such reexamination will be authorized only in the most unusual instances.

SPECIAL MEDICAL EXAMINATION CONSIDERATIONS

The following special medical examination considerations are set forth in order that candidates, prospective candidates, and their private physicians and dentists may have the basic medical requirements for entrance to the Academy readily available.

**Medical History.** The medical history will be compiled with particular care, with elaboration where indicated. Inquiries will be made in detail concerning all illnesses, injuries, and operations which candidates may have incurred. Failure to fully document these items results in disappointment when medical disqualification is determined later. A history of familial diseases will be investigated thoroughly. If the candidate has received medical care which significantly affects his physical condition he will be required to submit evidence from attending physicians or from hospital records concerning this medical care. *A candidate who has defects which are remedial, including dental defects, should have them corrected prior to taking the Qualifying Medical Examination.*

Weight Standards

Height (inches) * _____	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78
Weight (pounds):															
Minimum _____	105	106	107	111	115	119	123	127	131	135	139	143	147	151	153
Maximum _____	183	187	191	196	202	208	214	219	225	231	237	243	248	254	260

\*Waiver for height up to 80 inches may be granted to a limited number of candidates with exceptional scholastic and leadership achievements.

These weight standards are necessarily arbitrary and waiver may be granted in unusual cases. For example, when a generally large bony structure and large well-distributed and proportioned

muscle masses with little evidence of thick layers of subcutaneous fat account for the apparent excessive weight, the Permanent Board of Medical Examiners at the Naval Academy may recommend waiver consideration to the Academy's Academic Board. When weight is under the prescribed standards, if the skeletal structure is relatively slight but muscle development and strength are excellent, as manifested by demonstrable performance of physical aptitude tests and a history of athletic participation, similar action may be taken. Obesity is disqualifying.

**Eyes and Vision:** A cycloplegic refraction is required on all candidates. Unaided visual acuity of 20/20 is required. Waivers may be granted to a limited number of candidates with exceptional scholastic and leadership achievements whose vision is no worse than the following:

Either Eye	Other Eye
20/50	20/40
20/70	20/30
20/100	20/20

In addition, waivers may be granted to a very few candidates with outstanding qualifications whose vision is no worse than 20/100 in each eye. In all cases, the visual acuity must correct to 20/20 in each eye.

In the report of examination, the actual vision of each eye and the correction lens, if required, must be recorded. Excessive refraction errors are disqualifying. Both eyes must be free from any disfiguring or incapacitating abnormality and from acute or chronic disease. Candidates wearing contact lenses will remove them at least 72 hours prior to reporting for medical examination. Acceptable color perception is required. Results of color tests will reflect the name of the test, the number of plates correctly read, and the number of plates in the test, i: e., 14/17 etc. Use of a Farnsworth Lantern is required where available.

**Heart and Vascular System:** An electrocardiogram is required of all candidates. The following conditions may be causes for rejection and require complete medical evaluation: all organic valvular diseases of the heart, including those improved by surgery; EKG evidence of variations from normal heart beat; hypertension evidenced by predominant blood pressure reading of 140 mm or more systolic or 90 mm or more diastolic. The following are causes for rejection: varicose veins, if severe or symptomatic; heart rate greater than 100 on repeated examinations; substantiated history



of rheumatic fever within the previous 2 years; recurrent attacks of rheumatic fever or evidence of residual cardiac damage; history of recurring rapid heart beat within the preceding 5 years (paroxysmal tachycardia).

**Ears and Hearing:** Auditory acuity of all candidates will be determined by audiometer if available. Whispered voice at 15 feet right and left ear is acceptable if audiometric equipment is not available. Maximum acceptable hearing loss is indicated on the following chart:

Frequency	500	1000	2000	3000	4000	8000
	512	1024	2048	2896	4096	8192
Maximum loss: in decibels						
Better ear -----	15	15	15	35	(1)	(1)
Worse ear -----	15	15	15	35	(1)	(1)

<sup>1</sup> Record for baseline information only.

Both ears must be free from any disfiguring or incapacitating abnormality and from acute or chronic disease.

**Nares:** Septal deviation, hypertrophic rhinitis, or other conditions which result in 50 percent or more obstruction of either airway, or which interfere with drainage of a sinus on either side, are causes for rejection.

**Skin:** Chronic skin diseases such as severe acne or eczema or unsightly congenital markings are cause for disqualification. Pilonidal sinus, if evidenced by presence of mass or discharging sinus, is cause for rejection.

**Serologic Tests:** A serologic test for syphilis is performed on all candidates. An authentic history of syphilis of any type is cause for rejection without further laboratory procedure.

**Genitourinary System:** Persistent or recurrent albuminuria of any type or the persistence of casts in the urine will be cause for rejection, even though the etiology cannot be determined. Other causes for rejection: marked phimosis, epispadias or pronounced hypospadias; atrophy, deformity, or maldevelopment of both testicles; or an undescended testicle of any degree. Bed wetting persisting into late childhood or early adolescence is cause for rejection.

**Neurological Examination:** A history of motion sickness (i.e., air, sea, swing, train, or carnival ride) should be thoroughly investi-

gated. A history of head injury in the past five years resulting in unconsciousness must be completely evaluated and an electroencephalogram is required. Evidence of degenerative disorders and conditions such as established migraine are causes for rejection.

**Asthma:** Asthma, or recurrent athsmatic bronchitis by diagnosis or history since age 12, is cause for rejection.

**Abdominal Wall Examination:** Hernia of any type is disqualifying until corrected; history of operation for hernia within past 60 days is disqualifying. Other abnormal diseases and conditions which are not acceptable include stomach or small bowel ulcer or history of same; acute or chronic gall bladder disease; history of removal of spleen for reason other than trauma.

**Miscellaneous Medical Findings that are Disqualifying:** Acute communicable diseases; anemia; abnormal bleeding states; diabetes mellitus or history of diabetes in both parents; persistent sugar in urine regardless of cause; ununited fractures; history of surgery to a major joint within past 6 months; history or derangement of knee joint not corrected by surgery, or evidence of instability subsequent to surgery; total loss of either thumb; tuberculosis, active in past 5 years; hay fever, if severe, or having undergone hyposensitization therapy for severe hay fever during the 3 years prior to examination; nasal polyps; personality disorders; symptomatic immaturity disorders such as stammering or stuttering; arthritis; and herniated nucleus pulposus or history of operation for this condition.

**Dental Standards:** A candidate for appointment must have a minimum of 16 natural permanent teeth, of which a minimum of 8 must be in each arch. All missing teeth causing unsightly spaces or significantly reducing masticatory or incisal efficiency must be replaced by well-designed bridges or partial dentures which are in good condition. Except for minor or questionable carious areas, all required dental treatment *must* be completed. Candidates undergoing active orthodontic treatment will be temporarily disqualified. Each such applicant will be considered on an individual basis by the Permanent Board of Medical Examiners at the Academy. Disqualifying defects are as follows:

- Lack of satisfactory incisal or masticatory function.
- Less than a minimum of 8 natural permanent teeth in each arch.
- Edentulous spaces which are unsightly or which significantly reduce masticatory function.



- Carious teeth, except minor or questionable carious areas.
- Infectious or chronic diseases of the soft tissue of the oral cavity.
- Marked malocclusion resulting in severe dentofacial deformity.
- Unsatisfactory restorations, bridges, or dentures.
- Severe or extensive apical or periodontal infection.
- Perforations from the oral cavity into the nasal cavity or maxillary sinus.
- Tumors or cysts of the oral tissues which require treatment or may require treatment in the foreseeable future.

## MEDICAL EXAMINING CENTERS

### ALABAMA

Fort Rucker, Daleville  
Maxwell AFB, Montgomery

### ALASKA

Elmendorf AFB, Anchorage  
USNAS, Adak  
USNAS, Kodiak

### ARKANSAS

Blytheville, AFB, Blytheville  
Little Rock AFB, Jacksonville

### ARIZONA

Davis-Monthan AFB, Tucson  
Fort Huachuca, Cochise County  
Williams AFB, Chandler

### CALIFORNIA

Beale AFB, Marysville  
Castle AFB, Merced  
Edwards AFB, Edwards  
Fort Ord, Monterey  
George AFB, Victorville  
Hamilton AFB, Ignacio  
Letterman Gen Hosp, San Francisco  
March AFB, Riverside  
Mather AFB, Sacramento  
McClellan AFB, Sacramento  
Travis AFB, Fairfield  
NAS, Alameda  
Naval Hosp, Camp Pendleton  
NAF, El Centro  
NAAS, Ream Fld, Imperial Beach  
NAS, Lemoore  
Naval Hosp, Long Beach

NAS, Los Alamitos, Long Beach  
NAS, Moffett Field  
NALF, Monterey  
Naval Hosp, Oakland  
Naval Missile Ctr, Point Mugu  
MCAS, El Toro, Santa Ana  
Naval Hosp, San Diego  
NAS, North Island, San Diego  
NAS, Miramar, San Diego  
Vandenberg AFB, Lompoc

### COLORADO

Fitzsimons Gen Hosp, Denver  
Lowry AFB, Denver  
USAF Academy

### DELAWARE

Dover AFB, Dover

### DISTRICT OF COLUMBIA

Andrews AFB  
NAF Washington, Andrews AFB  
Walter Reed Gen Hosp

### FLORIDA

Elgin AFB, Valparaiso  
Homestead AFB, Homestead  
MacDill AFB, Tampa  
Tyndall AFB, Panama City  
NAS, Cecil Field  
Naval Hosp, Jacksonville  
NAS, Jacksonville  
Naval Hosp, Key West  
Naval Hosp, Pensacola  
NAS, Sanford

## **GEORGIA**

Fort Benning, Columbus  
Fort Gordon, Groveton  
Fort McPherson, Atlanta  
Fort Stewart, Hinesville  
Moody AFB, Valdosta  
Robins AFB, Warner Robins  
NAS, Atlanta  
NAS, Glynco

## **HAWAII**

Hickman AFB, Honolulu  
Tripler Gen Hosp, Honolulu  
USNAS, Barbers Point

## **IDAHO**

Mountain Home AFB, Mountain  
Home

## **ILLINOIS**

Chanute AFB, Rantoul  
Fort Sheridan, Highland Park  
Scott AFB, Belleville  
Naval Hosp, Great Lakes  
NAS, Glenview

## **INDIANA**

Bunker Hill AFB, Peru  
Fort Benjamin Harrison,  
Indianapolis

## **KANSAS**

Fort Leavenworth, Leavenworth  
Fort Riley, Junction City  
McConnell AFB, Wichita  
NAS, Olathe

## **KENTUCKY**

Fort Knox, Hardin County

## **LOUISIANA**

Barksdale AFB, Shreveport  
England AFB, Alexandria  
NAS, New Orleans

## **MAINE**

Dow AFB, Bangor  
Loring AFB, Limestone  
NAS, Brunswick

## **MARYLAND**

Fort George G. Meade, Odenton  
NTC, Bainbridge  
US Naval Academy, Annapolis  
NAS, Patuxent

## **MASSACHUSETTS**

Boston Army Base, Boston  
Fort Devens, Ayer  
Otis AFB, Falmouth  
Naval Hosp, Chelsea  
NAS, South Weymouth  
Westover AFB, Chicopee Falls

## **MICHIGAN**

Kincheloe AFB, Kincross  
K. I. Sawyer AFB, Gwinn  
Selfridge AFB, Mt. Clemens  
NAS, Grosse Ile  
Wurtsmith AFB, Oscoda

## **MINNESOTA**

NAS, Minneapolis

## **MISSISSIPPI**

Columbus AFB, Columbus  
Keesler AFB, Biloxi  
NAAS, Meridian

## **MISSOURI**

Fort Leonard Wood, Waynesville  
Richard-Bebaur AFB, Grandview  
Whiteman AFB, Knob Noster

## **MONTANA**

Glasgow AFB, Glasgow  
Malmstrom AFB, Great Falls

## **NEBRASKA**

Offutt AFB, Omaha

## **NEVADA**

Nellis AFB, Las Vegas

## **NEW HAMPSHIRE**

Pease AFB, Portsmouth  
Naval Hosp, Portsmouth

## **NEW JERSEY**

Fort Dix, Wrightstown  
Fort Monmouth, Oceanport  
McGuire AFB, Wrightstown  
NAS, Lakehurst

## **NEW MEXICO**

Cannon AFB, Clovis  
Holloman AFB, Alamogordo  
Kirtland AFB, Albuquerque



## **NEW YORK**

Griffis AFB, Rome  
Plattsburgh AFB, Plattsburgh  
Stewart AFB, Newburgh  
Suffolk County AFB, Westhampton Beach, L. I.  
U. S. Military Academy, West Point  
NAS, New York  
Naval Hosp, St. Albans, L. I.

## **NORTH CAROLINA**

Fort Bragg, Fayetteville  
Seymour Johnson AFB, Goldsboro  
Naval Hosp, Camp Lejeune  
MCAS, Cherry Point

## **NORTH DAKOTA**

Grand Forks AFB, Meckinock  
Minot AFB, Minot

## **OHIO**

Lockbourne AFB, Columbus  
Wright-Patterson AFB, Dayton

## **OKLAHOMA**

Altus AFB, Altus  
Clinton-Sherman AFB, Burns Flat  
Fort Sill, Lawton  
Tinker AFB, Oklahoma City

## **OREGON**

Portland International Airport, Portland

## **PENNSYLVANIA**

Carlisle Barracks, Carlisle  
NAF, Johnsville  
Naval Hosp, Philadelphia  
NAS, Willow Grove  
Valley Forge Gen Hosp, Phoenixville

## **RHODE ISLAND**

Naval Hosp, Newport  
Naval Stn, Newport  
NAS, Quonset Point

## **SOUTH CAROLINA**

Charleston AFB, Charleston  
Fort Jackson, Columbia  
Shaw AFB, Sumter  
Naval Hosp, Beaufort  
Naval Hosp. Charleston

MCAS, Beaufort

## **SOUTH DAKOTA**

Ellsworth AFB, Rapid City

## **TENNESSEE**

Fort Campbell, Clarkesville  
Sewart AFB, Smyrna  
NAS, Memphis

## **TEXAS**

Amarillo AFB, Amarillo  
Bergstrom AFB, Austin  
Carswell AFB, Fort Worth  
Dyess AFB, Abilene  
Fort Hood, Killeen  
Fort Sam Houston, San Antonio  
Lackland AFB, San Antonio  
Laughlin AFB, Del Rio  
Perrin AFB, Sherman  
Randolph AFB, San Antonio  
Reese AFB, Lubbock  
Sheppard AFB, Wichita Falls  
NAAS, Beeville  
Naval Hosp, Corpus Christi  
NAS, Corpus Christi  
NAS, Dallas  
NAS, Kingsville  
Webb AFB, Big Spring  
William Beaumont Gen Hosp, El Paso

## **UTAH**

Hill AFB, Ogden

## **VIRGINIA**

Langley AFB, Hampton  
Fort Belvoir, Fairfax County  
Fort Eustis, Lee Hall  
Fort Lee, Petersburg  
Fort Monroe, Old Point Comfort  
NAS, Norfolk  
Naval Hosp, Portsmouth  
Naval Hosp, Quantico  
MCAS, Quantico  
NAS, Virginia Beach

## **WASHINGTON**

Fairchild AFB, Spokane  
Fort Lewis, Tacoma  
McChord AFB, Tacoma  
Naval Hosp, Bremerton

NAS, Seattle  
NAS, Whidbey Island

#### **WYOMING**

Francis E. Warren AFB,  
Cheyenne

#### **CANAL ZONE**

Albrook AFB, Balboa  
Fort Clayton

#### **CUBA**

USN Hosp, Guantanamo Bay

#### **ENGLAND**

S. Ruislip Air Stn, Middlesex  
USN Support Activity, London

#### **GERMANY**

US Army Hosp, Heidelberg  
Wiesbaden AB, Wiesbaden

#### **GUAM**

USN Hosp

#### **ITALY**

USN Support Activity, Naples

#### **JAPAN**

Camp Zama  
Tachikawa AB, Honshu  
USN Hosp, Yokosuka

#### **NEWFOUNDLAND**

USN Stn, Argentia

#### **PHILIPPINE ISLANDS**

Clark AB, Luzon  
USN Hosp, Subic Bay

#### **PUERTO RICO**

Ramey AFB, Aguadilla  
USNAS, Roosevelt Rds

#### **SPAIN**

Torrejon AB  
USNAS, Rota

### **PROGRESS REPORTS ON QUALIFICATIONS**

In order to keep candidates informed concerning their qualification for admission, the Naval Academy will issue progress reports on academic, medical, and physical aptitude qualifications when such information is complete.

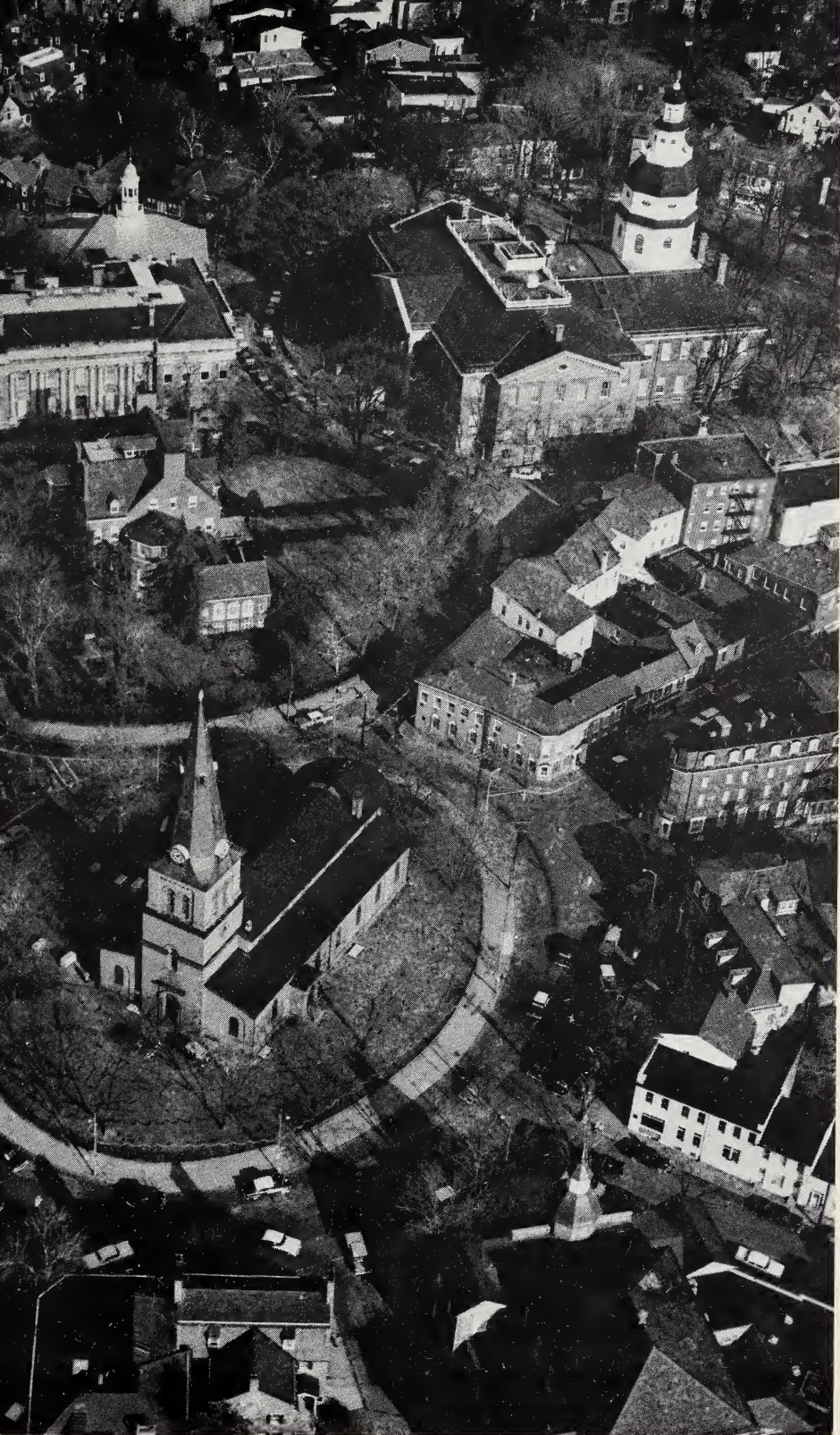
### **EARLY NOTIFICATION OF ADMISSION**

Candidates who hold principal nominations to the Naval Academy will be notified of acceptance as soon as they meet all entrance requirements. Additionally, the most outstanding among other qualified candidates may be notified early after completed evaluation and approval by the Academic Board. Candidates must complete the required College Entrance Examination Board tests not later than January in order to be considered for early notification.

### **ENTRANCE INFORMATION AND PROCEDURES**

Candidates for whom there are vacancies, who have subscribed to the "Engagement to Serve," and who have met the scholastic,





*View of Annapolis—the home of the Naval Academy.*





moral, and physical requirements, will receive appointments as midshipmen and be admitted to the Naval Academy.

● Each candidate for midshipman will be required to take the following oath of office upon entrance:

*"I, \_\_\_\_\_, of the State of \_\_\_\_\_ age \_\_\_\_\_ years \_\_\_\_\_ months, having been appointed a midshipman in the United States Navy, do solemnly swear (or affirm) that I will support and defend the Constitution of the United States against all enemies, foreign and domestic; that I will bear true faith and allegiance to the same; that I take this obligation freely, without any mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties of the office on which I am about to enter; So Help Me God."*

● He will also be required to subscribe to the following under oath:

*"For and in consideration of the privileges, opportunities, and benefits afforded me during the continuance of my service as a midshipman, I agree to and with the Superintendent of the United States Naval Academy, as follows:*

*"First: To enter the service of the Navy of the United States and, to the utmost of my power and ability, to be in everything conformable and obedient to the several requirements and lawful commands of the officers who may be placed over me.*

*"Second: I oblige myself, during such service, to comply with and be subject to the Uniform Code of Military Justice and such other laws and regulations as are or shall be established by the Congress of the United States or other competent authority.*

*"Third: To submit to treatment for the prevention of smallpox, typhoid (typhoid prophylaxis), and to such other preventive measures as may be considered necessary by naval authorities."*

Candidates are usually sworn in as midshipmen on the day they are accepted for admission, i.e., the date of reporting to the Naval Academy as designated in the authorization to report issued by the Bureau of Naval Personnel. Due to limited living accommodations in the city of Annapolis, candidates are urged to time their arrival at Annapolis to coincide as closely as possible with the reporting date, keeping in mind, however, that transportation facilities between Washington and Baltimore and Annapolis are not unlimited. Those arriving in Annapolis a day or two prior to



their reporting date may take advantage of berthing and messing facilities usually made available in the Naval Academy at a cost of \$1 per night. Additionally, candidates may take their meals in the Midshipmen's Mess at a cost equal to the cost of a midshipman's daily ration allowance.

- In keeping with the policy of the Department of Defense and as directed by the Secretary of the Navy, candidates for appointment as midshipmen are required to execute a loyalty certificate. The purpose of this certificate is to aid in determining whether the candidate's conduct or associations, past or present, have been such as to cast any doubt whatever upon his loyalty to the Government of the United States.

The loyalty certificate includes a list of those agencies, groups, etc., designated by the Attorney General of the United States to be totalitarian, fascist, communist or subversive, or as having adopted a policy of advocating or approving the commission of acts of force or violence to deny persons their rights under the Constitution of the United States.

The admission of conduct or association, past or present, within the purview of acts as defined in the certificate, or association with any of the groups or organizations designated by the Attorney General, shall preclude appointment pending investigation and determination of eligibility by the Department of the Navy.

False representation, or failure fully to disclose conduct or associations defined in the certificate, shall constitute grounds for trial before a general court-martial with possible subsequent conviction and imprisonment, or for separation from the naval service under conditions other than honorable, with or without any preceding court-martial procedure.

- *Before being admitted as a midshipman, each candidate must deposit with the midshipmen's storekeeper the sum of \$300, to be used in part payment to cover cost of uniforms, clothing, etc.* In cases of extreme hardship this sum may be reduced to \$100, in which case money allowances for the individual will be reduced until the individual's account reaches prescribed levels. The amount deposited is not refunded, but is expended for entrance outfit, clothing, uniforms, etc., which become the property of the midshipman.

- The pay of the midshipman is \$2,053 a year, commencing at the date of his admission. Its purpose is to permit him to cover his expenses; i.e., uniforms, books, equipment, laundry, income tax,

spending money, etc., while at the Naval Academy.

- The regulation entrance outfit, plus the additional uniforms, clothing, textbooks, and expenses required the first year, are valued at approximately \$1,600. The deposit made at the time of entrance is supplemented by an entrance credit of \$600 upon first admission to the Naval Academy. The \$600 credit is an interest-free loan advanced by the Government to defray the cost of the uniforms and equipment required during the first year. Repayment of the indebtedness is accomplished by monthly deductions of \$20 from the midshipman's pay, beginning in October of the second year at the Naval Academy and continuing until the indebtedness is liquidated. Midshipmen who are involuntarily separated from the Naval Academy prior to repayment of the entrance credit, are required to turn in all articles of uniform and equipment deemed suitable for reissue, to an amount sufficient to liquidate the indebtedness. If reclaimed articles are insufficient to cover the indebtedness, parents will be given an opportunity to liquidate the remaining debt; failing this, the remainder of the debt is canceled. Midshipmen applying for voluntary separation for their own convenience are required to repay in full the amount of indebtedness prior to such separation.

- *Every candidate must present his Social Security Card upon reporting for appointment.* If an individual has not obtained a Social Security number as a result of work experience prior to entering, he should obtain one based on the length of expected employment as a midshipman.

- Shortly after entrance, each midshipman (except Foreign Nationals) will be required to complete a Statement of Personal History. Candidates should be prepared to furnish such information as:

Names and locations of all schools attended.

Family names, dates and places of birth of parents, service data if parents are or were in armed forces, naturalization numbers of parents if applicable.

Relatives in foreign countries—relationship and location.

Names and addresses of former employers.

Names and addresses of three credit and five personal references. (Credit references may be those of parents.)



Residences during past 15 years. (Dates, street addresses, and cities are required.)

- Candidates admitted as midshipmen will be required to submit evidence of birth to the Superintendent, U.S. Naval Academy, for transmission to the Bureau of Naval Personnel upon admission, or as soon as practicable thereafter. A certified copy of the public record of birth is the best evidence. Supporting evidence will be required if the name on the evidence of birth is not identical with the name being used.

- Upon entrance, midshipmen will be required to obtain from the midshipmen's storekeeper a regulation entrance outfit. Slide rules and drawing sets are furnished as part of the outfit. Candidates are advised, therefore, not to purchase these items prior to entering the Academy.

- After being admitted to the Naval Academy, midshipmen receive travel and transportation allowances as prescribed in *Joint Travel Regulations* (ordinarily, mileage allowance of 6 cents per mile for authorized travel). The reimbursement will be paid to the midshipmen. Reimbursement will be made for the actual cost of passage fares on commercial vessels if sea travel is involved and provided no Government transportation was available. In the event travel originates outside the United States, candidates must contact the nearest naval activity for information as to the availability of Government transportation before endeavoring to procure commercial transportation. When Government transportation is not available, a certified statement to this effect must be presented in order for the candidate to be reimbursed after he has become a midshipman.

- The course of instruction at the Naval Academy is of 4-years' duration and is designed for the purpose of educating and training students to become officers in the Navy. The word "officers" as used in the foregoing sentence means officers of the line and does not include officers of the Medical Corps, Dental Corps, etc. The curriculum provides a basic education in naval science, science and engineering, and the humanities and social sciences. In addition, there is opportunity for advanced work through validation of college-level courses successfully completed elsewhere, and through a program of elective courses. No midshipman can be admitted or readmitted to other than the Fourth Class (freshman). Re-admitted midshipmen who previously completed successfully one or more years of the Naval Academy course may request advance-

ment to a higher class after reentry. There can be no deviation from the statutory age limits.

● Graduates of the Naval Academy, who meet all requirements, are commissioned as Ensigns in the Navy or (a limited number) as Second Lieutenants in the Marine Corps. While in previous years a few Naval Academy graduates have been commissioned in the Army and the Air Force, it is now the policy of the Secretary of the Navy that, subsequent to the commissioning of the Class of 1967, no midshipman will be allowed to transfer to another service upon graduation. Their commissions may be revoked at any time during the first 3 years following graduation from the Naval Academy. On successful completion of the probationary period, officers are permanently commissioned. Officers whose commissions are revoked shall be discharged from the service, without severance pay or allowance.

## SERVICE OBLIGATION OF MIDSHIPMEN

Enlisted members of the Armed Forces who accept appointments as midshipmen at the Naval Academy will not be discharged from their enlistment contracts or from their period of obligated service while they are in the status of midshipmen, except for physical disability or because of the acceptance of a commission. (Act of 25 June 1956, §§ 1-2, reenacted 10 U.S.C. 516.)

Midshipmen in this category who are separated from the Naval Academy, except for one of the two reasons given above, will have their appointments as midshipmen terminated and will immediately resume their enlisted status. Members so reverted will be required to serve out their enlistments or obligated service, unless sooner discharged. In computing the unexpired portion of an enlistment contract or period of obligated service, the time served as a midshipman shall be counted as time served under such contract or period of obligated service.

Candidates entering the Naval Academy from civil life, who had not previously acquired a military obligation, will automatically do so upon acceptance of appointment as midshipmen at the United States Naval Academy. Under Section 651 of Title 10, United States Code, any person who is enlisted, inducted, or appointed in any of the Armed Services or their reserve components acquires automatically a 6-year military obligation. Section IV. B. 3.f of Department of Defense Directive 1200.3 of 23 May 1958 includes appointees to the service academies among those who are subject to the 6-year obligation.



## AGREEMENT SIGNED BY ENTERING MIDSHIPMEN

Upon admission, each midshipman who is a citizen of the U.S. will be required to sign an agreement, with the consent of his parents or guardian if a minor, that he will fulfill these obligations:

- He will complete the Academy course of instruction (unless he is disenrolled from the Academy by competent authority).
- He will accept an appointment and serve as a commissioned officer in the United States Navy or United States Marine Corps for at least five years immediately after graduation.
- If authorized to resign from the Regular component before the sixth anniversary of his graduation, he will serve as a commissioned officer in the Reserve component until the sixth anniversary.

## POLICIES REGARDING DISENROLLMENT

He also signs a statement that he understands that the following are the policies of the Navy Department regarding disenrollment from the Naval Academy:

- Fourth and Third Classmen will be discharged in accordance with the regulations of the Navy Department. A resignation tendered by a Fourth or Third Classmen (or a resignation tendered by a Second Classman prior to the beginning of the Second Class academic year) will be accepted when found to be in the best interests of the service.

- Second and First Classmen. A Second Classman who is separated prior to the commencement of the Second Class academic year will be discharged in accordance with current regulations of the Navy Department. With the commencement of the Second Class academic year, a Second or First Classman who is separated prior to completing the course of instruction, except for physical disability, unfitness or unsuitability, will normally be transferred to the Reserve component in an enlisted status and be ordered to active duty for not less than two years under the provisions of Title 10, U. S. C. 6959b. Where separation occurs as a result of deficiencies, which are not considered willful, the active duty provision may be waived.

- Refusal to Accept Commission. Any First Classman who completes the course of instruction and declines to accept an appointment as a commissioned officer will be transferred to the Reserve component in an appropriate enlisted status and ordered to active duty for four years.

- A midshipman who is separated and who entered from the Regular or Reserve component of any service will revert to his former status under the appropriate statutory provisions. Completion or partial completion of a prior service obligation by a separated midshipman who entered from this status does not necessarily exempt him from transfer to a Reserve component and call to active duty in accordance with Title 10, USC 6959b.

- Officers of the Armed Services serve at the pleasure of the President. No terminal dates are established for their commissions.

## FOREIGN STUDENTS

Persons receiving instruction under authority of this law shall receive the same pay, allowances, and emoluments, to be paid from the same appropriations and, subject to such exceptions as may be determined by the Secretary of the Navy, shall be subject to the same rules and regulations governing admission, attendance, discipline, resignation, discharge, dismissal, and graduation, as midshipmen at the Naval Academy appointed from the United States; but such persons shall not be entitled to appointment to any office or position in the United States Navy by reason of their graduation from the Naval Academy. The entrance deposit will be required of all foreign students. Applications for appointment under provisions of this law must be addressed through diplomatic channels of the applicant's country. Nominations must reach the State Department in Washington, D.C., by 1 January 1969.

Each candidate must:

- Be an unmarried, bona fide male citizen of the nominating country and, unless otherwise approved by the Secretary of the Navy, be not less than 17 years of age nor more than 22 years of age on 1 July of the calendar year in which he enters the Naval Academy.

- Possess medical qualifications as specified in this pamphlet. All candidates must undergo a medical examination and a physical aptitude examination by a board of medical examiners designated by the Chief of Naval Personnel. Qualifying Medical and Physical Aptitude Examination will be conducted by the Permanent Medical Examining Board at the United States Naval Academy at the time of reporting for admission. Such candidates are therefore urged to undergo careful preliminary examination by qualified medical personnel informed of the physical requirements set



forth elsewhere in this pamphlet before leaving their homes for the Naval Academy. Those with obviously disqualifying defects may be spared the needless expense of the trip to Annapolis. However, in case of reasonable doubt as to whether defects are disqualifying, it is recommended that the telegraphic inquiry be addressed to the Superintendent, U.S. Naval Academy, Annapolis, Md., U.S.A.

- Be proficient in reading, writing, and speaking idiomatic English.

Candidates may meet scholastic entrance requirements by either of the following two methods:

- Submitting certificates from accredited secondary schools and colleges of the United States of America, or

- Taking the College Entrance Examination Board Scholastic Aptitude Test and Achievement Tests in English Composition and Mathematics, Level I or Level II.

Candidates will be given the same examination in English composition as other candidates, but due consideration will be accorded these foreign students when evaluating test results. Each candidate shall submit a certificate from his government that he is conversant with the literature of his native country and that he has completed a course in the literature of his native language equivalent in general to 2 years of secondary school work in literature in the United States. In lieu of this certification, a candidate may produce evidence of having acquired the units of literature from accredited schools of the United States.

The naval attaché or a diplomatic representative of the United States in the candidate's country shall furnish a report as to the candidate's proficiency in the use of idiomatic English.

Governments should submit the names of candidates as early as possible in order that they may qualify for entrance by the end of March and enter the Naval Academy in late June or early July, except in the cases of candidates attending secondary schools and colleges in the United States whose school records for the current year are essential to fulfillment of admission requirements. In such cases candidates may be granted until 25 June in order to permit completion of the required certificates. The nomination of the candidates should contain a statement of the method of admission under which he wishes to qualify.

In lieu of the oath of allegiance to the United States, a substitute oath will be required, in substance as follows:

*"I \_\_\_\_\_, a citizen of \_\_\_\_\_  
aged \_\_\_\_\_ years \_\_\_\_\_, months, having  
been appointed a midshipman at the United States Naval Academy,  
do solemnly swear to comply with all regulations for the police and  
discipline of the Naval Academy, and to give my utmost efforts to  
accomplish satisfactorily the required curriculum; do swear not to  
divulge any information of military value which I may obtain  
directly or indirectly in consequence of my presence at the United  
States Naval Academy to any alien government; and do agree that  
I shall be withdrawn from the United States Naval Academy if  
deficient in conduct, health, or studies."*

Notification will be given to the governments that students found by proper authority to be unsatisfactory in conduct, studies, or health will be accorded the same consideration given other midshipmen regarding withdrawal from the Academy or repetition of a year's work.

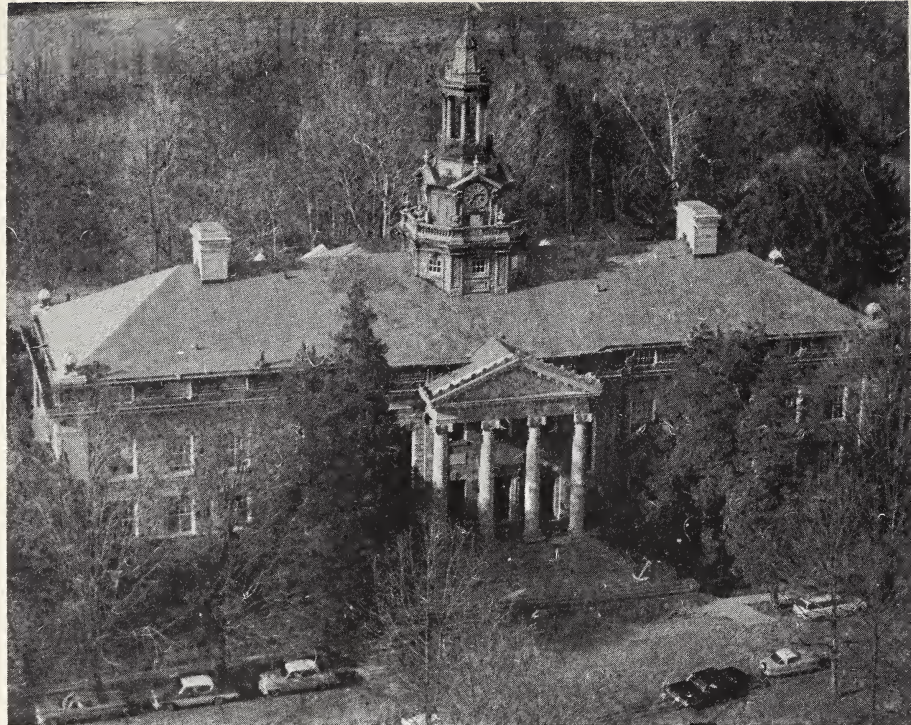
## PREPARATORY SCHOLARSHIPS

The U.S. Naval Academy Foundation, Inc., is a tax-exempt, non-profit organization which provides an educational assistance program to enable deserving young men, with minor academic deficiencies, to enhance their qualifications for admission to the Naval Academy. The Foundation is chartered for educational purposes under the laws of the State of Maryland. It has no official connection with the U.S. Navy or with the U.S. Naval Academy.

The Foundation provides a limited number of post-high-school preparatory scholarships annually to highly motivated and qualified young men seeking admission to the Naval Academy to prepare for a career in the Navy or Marine Corps. Cash grants for these scholarships are made to specific preparatory schools in various parts of the nation. Parents of young men selected for this program are expected to contribute financially within their capabilities. The Foundation offers no assistance to individual boys in obtaining their appointments.

Application should be made to the Executive Director, U.S. Naval Academy Foundation, Inc., 48 Maryland Avenue, Annapolis, Md. 21401. Applications must be received by 1 April each year.

Several other preparatory-school scholarships are available to young men seeking admission to the Naval Academy. Information concerning these scholarships may be obtained from the Chief of Naval Personnel (Pers-G211), Navy Department, Wash., D. C. 20370.



## U. S. NAVAL PREPARATORY SCHOOL

The Naval Preparatory School, currently located at Bainbridge, Maryland, has prepared servicemen for entry into the Naval Academy for over half a century. Up to 350 enlisted men, almost all regular or reserve Navy and Marine Corps personnel, are enrolled at the school from September to May each year. The current class is about half regular and half reserve.

Applicants meeting basic qualifications for entry into the Naval Academy should apply through their commanding officers in accordance with current service directives. Students are selected competitively based on a review of their records, including academic transcripts, the recommendations of their commanding officers, and their scores on the Naval Preparatory Entrance Examination.

The Preparatory School offers college-preparatory work in mathematics, physics, chemistry, and English. Students with superior backgrounds and abilities are able to undertake more-advanced work, including courses at the college freshman level. Military, physical training, and sports programs, both intramural and varsity, complete the School's schedule.



## IMPORTANT DATES FOR CANDIDATES

### 1968

July     The Navy Department begins officially accepting the names of candidates nominated for appointment in 1969.

Medical Examining Centers commence conducting Medical and Physical Aptitude Examinations.

The U.S. Civil Service Commission holds the first of several competitive tests for Members of Congress who utilize this means of selecting their candidates.

November 2     Administration of College Entrance Examination Board Scholastic Aptitude Tests (SAT).

December 7     Administration of College Entrance Examination Board Tests (SAT and Achievement).

### 1969

January 11     Administration of College Entrance Examination Board Tests. (SAT and Achievement). Candidates must complete required CEEB Tests by this date in order to be considered for early notification.

January 15     Early notification begins.

January 31     Closing date for the nomination of candidates.

March 1     Administration of College Entrance Examination Board Tests (SAT and Achievement).

March 15     Final decision reached on medical and physical qualifications by this date.

April 15     Bureau of Naval Personnel notifies candidates of the status of their candidacy and begins to issue authorizations to report for appointment as midshipmen to successful candidates.

June 25     Date on which successful candidates are authorized to report to the Naval Academy for appointment as midshipmen.





## The Naval Officer's Career

### A WAY OF LIFE

Inscribed in Latin above the bronze doors of the Naval Academy Chapel is the motto *Not Self, But Country*—a motto which the young candidate embraces the moment he takes the oath as a midshipman and which will be a part of his being for the rest of his life. His education at the Academy has been designed for one purpose only: to prepare him for a lifetime career as a dedicated professional in the Naval Service. After four years of intensive study at Annapolis, he is ready to assume his responsibilities as an officer in the greatest Navy in the world.

This is a complex Navy—one whose ships range every ocean, whose officers and men not only sail the seas but who are engaged in construction and research from the tropics to the poles, whose supersonic planes have provided the training ground for America's first astronauts, whose nuclear submarines are a testimony to America's engineering genius, whose leaders advise in the highest councils of government, and whose Marines stand sec-



ond to none where tales of valor are told. This is a vastly complicated and technological Navy, yet one in which the human being is, in the end, all-important. It is an organization which puts a high premium on leaders with vision, dedication, and ability. It is a Navy with a proud past and a promising future, broad enough to provide a stimulating challenge in a wide spectrum of interesting fields.

## FIRST DUTY

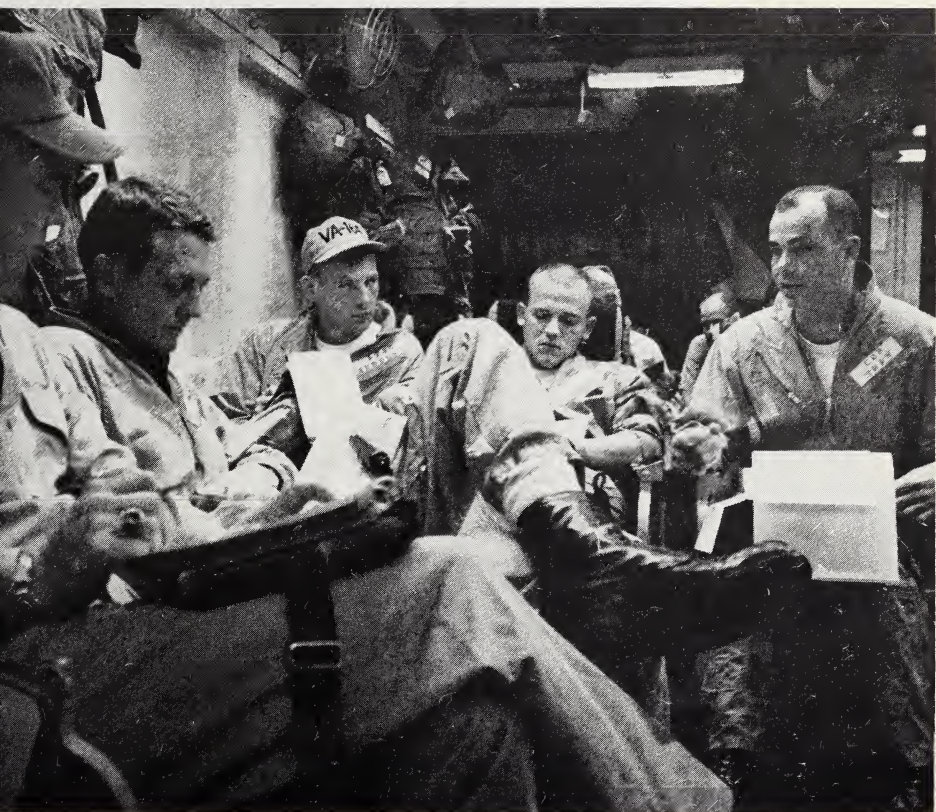
A graduate's first career opportunity comes in his choice of branch of service. The priority assigned his individual preference is dependent upon a number of factors, including his class standing, the needs of the service, and his personal qualifications; but every attempt is made to assign him to the duty and locality of his first choice.

Whatever his initial operational duty, he will usually find that his responsibilities are larger than those of his contemporaries in civilian life. Most Naval Academy graduates are commissioned as Ensigns in the line and are, thus, ultimately headed for command at sea. The majority go to sea initially on a combatant-type ship—i.e., aircraft carrier, cruiser, destroyer, or amphibious ship—but some go directly to studies leading to advanced degrees. Others remain ashore to attend specialized schools before joining the Fleet. Included in those attending specialized schools are graduates entering the nuclear submarine field and those headed for flight training and a career in naval aviation.

A small number are commissioned on graduation in the Civil Engineer Corps, in the Supply Corps, or as Engineering Duty Officers. The civil engineer designees, after a short tour in a Public Works or Seabee outfit, proceed to graduate studies at a civilian university. Supply Corps officers attend a special Navy school of several months' duration prior to their first operating assignment. The Engineering Duty Officers (specialists in ship design, construction, and repair) will normally spend several months aboard ship before returning to graduate study. Those commissioned as Second Lieutenants in the Marine Corps are ordered to a course in basic training before joining regular Marine units.

## OFFICER CAREER PATTERNS

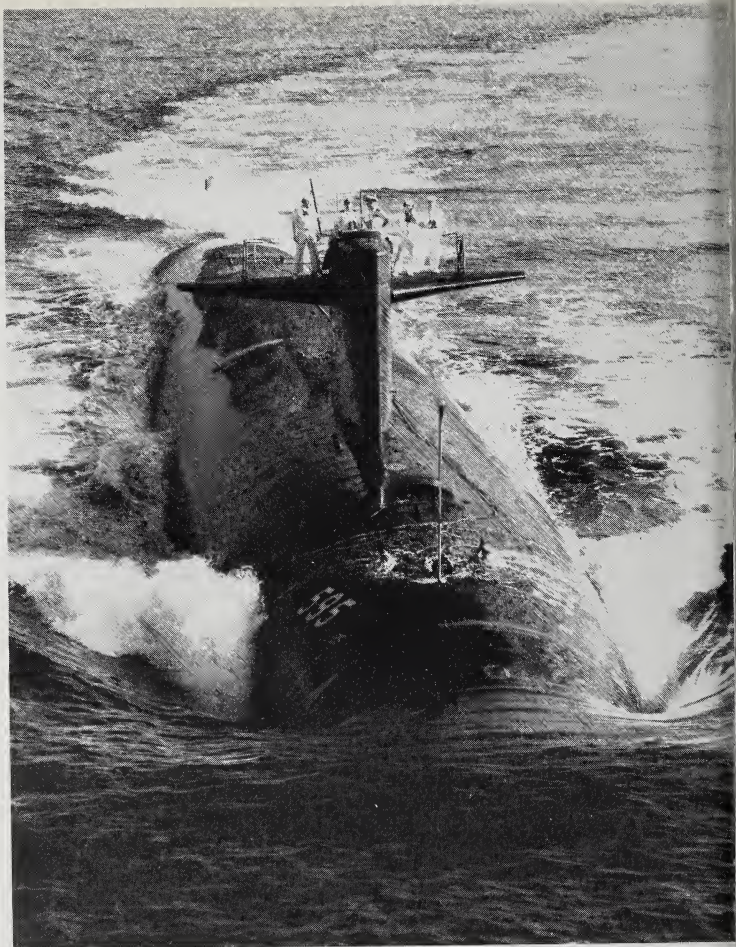
Within the framework of the needs of the service, an officer determines his own career pattern to a significant degree through his



*Destroyer wardroom and carrier pilots' briefing.*



Nuclear  
submarine



marines





requests for assignments afloat and ashore, his advanced studies, and, of course, by his performance. Most graduates, after their first tour at sea, elect to continue as line officers, many of them requesting assignment at this time to flight or submarine training. A small number may apply to serve in more specialized fields, and are designated, as were some of their classmates at graduation, as Civil Engineer Corps, Supply Corps, or Engineering Duty Officers. The careers of many of these specialists tend to concentrate in the industrial management field and, to some extent, in research and development, and much of their work is with the civilian world.

A line officer finds that tours of operational duty with fleet components are alternated with assignments to bureaus, offices, and activities in the Navy's vast shore establishment. Experience at sea is of prime importance to this officer, for it is at sea that he increases his competence as a mariner and as a leader. The early years of experience at sea form a basis for his career, which will include bringing his seagoing experience to the management of certain supporting shore facilities. Assignments are varied and interesting, and include not only military command but the opportunity to work with the civilian employees of the Armed Forces as well as with members of other services. In all assignments, individual preference is given careful consideration.

Officer careers continue along many paths, depending upon individual experience and background. After his graduate tour, a line officer may return to sea as a head of department in a destroyer or commanding officer of a smaller combatant vessel. Line officers who are aviators may expect to resume duty in an aircraft squadron based in a carrier or ashore. Others who are qualified in submarines will continue in duties preparing them for submarine command, which comes after about 12 years of commissioned service.

Every officer may expect to serve in assignments in which his education and naval training will be most valuable. Many unrestricted line officers, whose specialty is naval warfare and command at sea, qualify for a subspecialty which they exercise during periods of shore duty. These subspecialties include such varied fields as naval intelligence, oceanography, communications, meteorology, nuclear engineering, and aeronautical engineering. In addition, officers aspiring to command at sea will serve in a variety of ships or aircraft in different capacities as well as in staff and planning billets afloat and ashore, in the United States and overseas, to prepare them further for command.

It is a satisfying but demanding life. The naval officer presents

*The Navy's  
senior admiral,  
Admiral  
Thomas H. Moorer*



many faces to the world: Fleet Commander, engineer, scientist, diplomat, and educator. His is not just a job, but a way of life—a career dedicated to the service of the United States carrying with it high professional prestige and opportunities for broad experience—a career which rewards the industrious, the sincere, the adventurous, and the imaginative. The Navy is not a career field for those who prefer a soft life and who shy away from challenges. It is, rather, one for those to whom the homely virtues of the strenuous life, patriotism, and dedication to an ideal have a real meaning which can be translated into a lifetime of service in the Navy of the United States.

#### OFFICER EDUCATION AND TRAINING

Upon graduation and commissioning, the new officer may lay his books aside momentarily, but his theoretical and practical education will continue as long as he is in the service. From graduation day forward, he will continue to prepare himself for assignments of greater responsibility and professional attainment by acquiring prac-

ical experience ashore and afloat and through advanced academic work. The extent of his attainment is limited only by his ability, initiative, energy, and resourcefulness, commensurate with logical career planning.

The Naval Academy is considered but the first step in the educational ladder for the typical officer, and so the Navy sponsors a wide variety of programs, at both naval and civilian institutions, designed to prepare the officer for higher responsibility in the service of the United States. This move toward graduate education is begun in some cases before graduation, when some midshipmen are selected for scholarships in civilian universities or for Navy-sponsored graduate programs. Most notable of the scholarships, and one in which Academy graduates have been most successful to date, has been the Rhodes scholarship, tenable at Oxford University.

As has been noted, a small number of officers who have been selected for a specialty career in engineering will normally proceed to graduate work for the master's degree shortly after graduation. For the majority, however, Navy functional and basic technical courses provide their first post-commissioning training. Mostly of short duration, they are in such fields as communications, gunnery, antisubmarine warfare, damage control, electronics, and amphibious warfare.

After the first tour (3 to 6 years) of operational duty with the fleet, many qualified Naval Academy graduates may expect orders to graduate study for one or more years. Many fields of study are open to them, including, but not necessarily restricted to, those of mathematics, physics, general science, various types of engineering (nuclear and aeronautical, for example), management, international relations, and naval intelligence. For the best-qualified, the way is open to a doctorate. Courses are conducted at the U.S. Naval Postgraduate School, Monterey, Calif.; the Naval Intelligence School, Washington, D.C.; the Test Pilot School, Patuxent River, Md.; and at various civilian institutions such as Carnegie Institute of Technology, Harvard, MIT, Princeton, Rensselaer, Stanford, and Tulane.

It should be noted not only that opportunities for graduate work are afforded in the early years of commissioned service, but that they continue throughout an officer's career. Senior war colleges, in particular, are noted for bringing officers up to date on problems of international import and for relating these problems to our global strategy. The officer who aspires to positions of high responsibility will, of necessity, have to continue to grow intellectually and thus



be part-student all of his professional life.

Following, for information, is a brief summary of graduate study opportunities offered by the Navy. The program summarized is typical of recent years. It should be noted that additional opportunities for graduate study are available to highly qualified graduates through Fulbright, Olmstead, Churchill, and Rhodes Scholarship programs and through Atomic Energy Commission, National Science Foundation, Guggenheim and other Fellowships. Over 100 members of the Class of 1968 were preselected for various graduate study programs.

### TECHNICAL CURRICULA

Curriculum	Location	Degree Attainable
Advanced Science -----	U.S. Naval Postgraduate School (USNPGS), Monterey (1 year), followed by study at selected civilian institutions.	M.S./Ph. D.
Aeronautical Engineering -----	USNPGS, Monterey -----	B.S./M.S./ Ae. E.
Civil Engineering (Advanced) --	Illinois, Michigan, M.I.T., Stanford, Princeton, etc.	M.S.
Communications Engineering --	USNPGS, Monterey -----	B.S./M.S.
Management/Data Processing --	USNPGS, Monterey -----	M.S.
Electrical Engineering -----	University of Michigan -----	M.S.
Engineering Electronics -----	USNPGS, Monterey -----	B.S./M.S.
Engineering Electronics -----	USNPGS, Monterey, University of Michigan.	M.S.
Engineering Science -----	USNPGS, Monterey -----	B.S.
Environmental Sciences (Meteorology and Oceanography options).	USNPGS, Monterey -----	B.S./M.S.
Hydrographic Engineering (Geodesy).	Ohio State University -----	M.S.
Management and Industrial Engineering.	R.P.I. -----	M.S.
Mechanical Engineering -----	R.P.I. -----	M.S.
Metallurgical Engineering -----	Carnegie Tech -----	None.
Naval Construction and Engineering.	M.I.T. and Webb Institute of Naval Architecture.	M.S./Nav. E.
Naval Mechanical and Electrical Engineering.	USNPGS, Monterey -----	B.S./M.S.
Nuclear Engineering (Advanced).	M.I.T. (many include 6-month course at Westinghouse Electric).	M.S.
Nuclear Engineering (Effects) --	USNPGS, Monterey -----	B.S./M.S.
Nuclear Power Engineering --	Universities of California (Berkeley) and Michigan.	M.S.

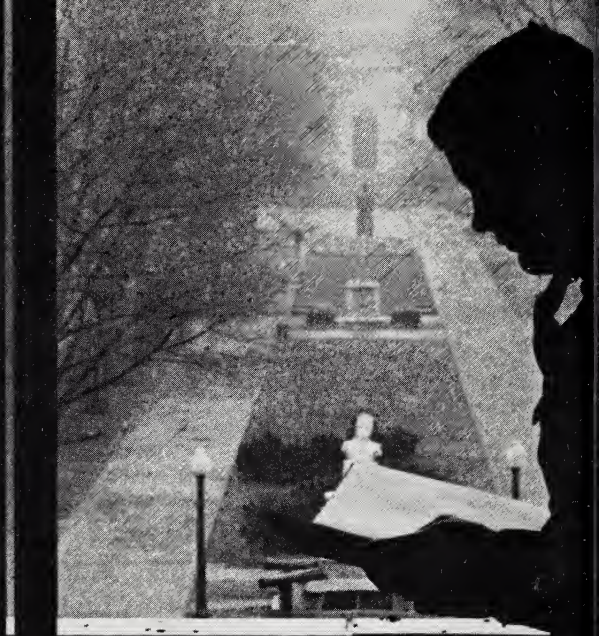
Curriculum	Location	Degree Attainable
Oceanography -----	USNPGS, Monterey, University of Miami (Florida), Texas A&M, and University of Washington.	B.S./M.S.
Operations Analysis -----	USNPGS, Monterey -----	B.S./A.S.
Petroleum Engineering -----	University of Texas -----	M.S.
Textile Technology -----	North Carolina State -----	M. Tex. Tech.
Weapons Systems -----	USNPGS, Monterey -----	B.S./M.S.
Ph.D. Studies -----	(Location and length of study determined subsequent to selection of candidates).	Ph. D.

### NONTECHNICAL CURRICULA

Business Administration -----	Harvard and Stanford Universities.	M.B.A.
Defense Intelligence -----	Defense Intelligence School --	None.
Financial Management -----	George Washington University.	M.B.A.
International Relations -----	American and Harvard Universities.	M.A.
Logistics (AFIT Course) -----	AFIT, Wright-Patterson AFB, Ohio.	M.S.
Naval Management -----	USNPGS, Monterey -----	M.S.
Petroleum Administration and Management.	Southern Methodist University.	M.S.
Petroleum Management -----	University of Kansas -----	M.S.
Political Science -----	Fletcher School of Law and Diplomacy, Tufts University.	M.A.
Procurement Management ----	University of Michigan -----	M.B.A.
Public Relations -----	Boston University -----	M.S.
Retailing -----	Pittsburgh University -----	M.B.A.
Subsistence Technology -----	Michigan State University ---	M.B.A.
Systems Inventory Management.	Harvard University -----	M.B.A.
Transportation Management --	Michigan State University ---	M.B.A.
Ph. D. Studies -----	(Location and length of study determined subsequent to selection of candidates.)	Ph. D.







## The Academic Program

The 4-year academic program of the Naval Academy is undergraduate in scope and leads to the Bachelor of Science degree. The awarding of the Bachelor of Science degree to graduates of the Naval Academy is authorized by act of Congress. The degree is accredited by the Middle States Association of Colleges and Secondary Schools.

### THE BASIC AND CORE CURRICULUMS, MINOR AND MAJOR

The *basic* curriculum consists of a *core* curriculum of 34 courses plus a *minor* program of six elective courses. Every midshipman is required to complete the courses in the core curriculum (or to validate equivalent college-level work) and to complete one of the 23 minors offered. An outline summary of the Academy's basic curriculum, including related summer drills and lectures for which no academic credit is granted, appears on the following page.

The core curriculum provides midshipmen with the educational background in physical

## THE BASIC CURRICULUM

### FOURTH CLASS YEAR <sup>1</sup>

	First Semester	Hours Class-Lab		Second Semester	Hours Class-Lab
H101	Composition and Literature	3-0	H102	Composition and Literature	3-0
L101	Modern Languages	3-0	L102	Modern Languages	3-0
M111	Calculus I	4-0	M120	Calculus II	4-0
N105	Air-Ocean Environment, <i>or</i>	3-0	S102	General Chemistry II	3-2
N106	Introduction to Psychology and Leadership	3-0	W102	Fundamentals of Weapons and Engineering	3-0
S101	General Chemistry I	3-2	P102	Basic Deck Seamanship	
T101	Physical Education		T102	Physical Education	
X101	Infantry Drill		X102	Infantry Drill	
		16-2			16-2
	Sem Hrs	17		Sem Hrs	17

### THIRD CLASS YEAR <sup>2</sup>

	First Semester	Hours Class-Lab		Second Semester	Hours Class-Lab
E209	Engineering Statics and Dynamics	4-0	E210	Mechanics of Materials	3-2
H201	European Civilization and World Power since the French Revolution	3-0	M224	Analysis IV	4-0
M215	Calculus III	4-0	N208	Navigation I	3-2
S211	General Physics I	3-2	S212	General Physics II	3-2
----	Elective (minor)	3-2 or 3-0	----	Elective (minor)	3-2 or 3-0
T201	Physical Education		T202	Physical Education	
X201	Infantry Drill		X202	Infantry Drill	
		17-2/4			16-6/8
	Sem Hrs	18/19		Sem Hrs	19/20

<sup>1</sup> Fourth Class Summer includes placement and validation tests; an introduction to mechanical, aeronautical, and naval engineering (Engineering Department); library briefings and lectures on history and traditions (English, History, and Government Department); rifle and pistol instruction (W100, Weapons Department); professional drills and lectures (P100 and P101, Naval Science Department); physical education orientation and indoctrination (T100, Physical Education Department); orientation and indoctrination (X100, Executive Department); hygiene lectures (Y100, Medical Department).

<sup>2</sup> Midshipmen train at sea for eight weeks with the Fleet during Third Class Summer (P201).



## SECOND CLASS YEAR <sup>1</sup>

	First Semester	Hours Class-Lab		Second Semester	Hours Class-Lab
H303	U.S. Government and Constitutional De- velopment	3-0	H304	Economic Analysis	3-0
M309	Analysis V	3-0	N318	Naval Operations Analysis	3-2
N313	Navigation II	2-2	S206	Modern Physics	3-0
S305	Introduction to Elec- trical Science	3-2	S306	Applications of Elec- trical Science	3-2
-----	Elective (minor)	3-2 or 3-0	-----	Elective (minor)	3-2 or 3-0
T301	Physical Education		T302	Physical Education	
X301	Infantry Drill and Naval Orientation		X302	Infantry Drill and Naval Orientation	
	Sem Hrs	14-4/6 16/17		Sem Hrs	15-4/6 17/18

## FIRST CLASS YEAR <sup>2</sup>

	First Semester	Hours Class-Lab		Second Semester	Hours Class-Lab
E313	Elements of Thermo- dynamics	3-2	E314	Elements of Fluid Mechanics	3-2
H403	History of Sea Power	3-0	H404	Readings in Western Ideas	3-0
N409	Leadership and Military Law	3-0	H406	The United States in World Affairs	3-0
N415	Operations and Tactics II	0-2	N416	Operations and Tactics III	0-2
W411	Ballistics and Weapons Control	3-2	W413	Weapons Systems Control	3-2
-----	Elective (minor)	3-2 or 3-0	-----	Elective (minor)	3-2 or 3-0
T401	Physical Education		T402	Physical Education	
X401	Infantry Drill and Naval Orientation		X402	Infantry Drill and Naval Orientation	
	Sem Hrs	15-6/8 18/19		Sem Hrs	15-6/8 18/19

<sup>1</sup> Second Class Summer includes aviation, submarine, and amphibious training, all conducted away from the Academy with Fleet operational and training units. At the Academy, summer studies include H300 Speech—One Sem Hr (1-0) and N311 Operations and Tactics I—Three Sem Hrs (2-2).

<sup>2</sup> Midshipmen train at sea for eight weeks with the Fleet during First Class Summer (P400).

and engineering sciences, social sciences and humanities, and in naval science which they will need to perform effectively as officers in the Naval Service. This is the primary goal of education at the Naval Academy.

The minors program provides midshipmen with a choice of disciplines for study in depth. Through validation and/or the carrying of additional courses, midshipmen are able to take advanced undergraduate work for the fuller development of individual talents. Many earn majors. Normally six courses beyond the minor make up the major. Twenty-three majors are offered. A complete listing of core courses, minors and majors programs, and course descriptions, by departments, is contained on pages 105 through 195. More than 300 elective courses are offered at the Academy.

## THE ACADEMIC ORGANIZATION

Responsibility for direction of the Naval Academy is vested in the Superintendent. This position is held by a flag officer of the Navy. The Superintendent is assisted by the Commandant of Midshipmen, who is responsible for directing the military and physical training and the administration of the Brigade of Midshipmen, and by a civilian Academic Dean, who supervises the academic curriculum and academic standards.

The Superintendent, the Commandant, the Dean, and other senior members of the faculty comprise the Academic Board, which makes major academic decisions and sets the academic standards of the Academy. There are seven academic departments: Engineering; English, History, and Government; Modern Languages; Mathematics; Naval Science; Science; and Weapons, each headed by a Navy captain who reports directly to the Academic Dean.

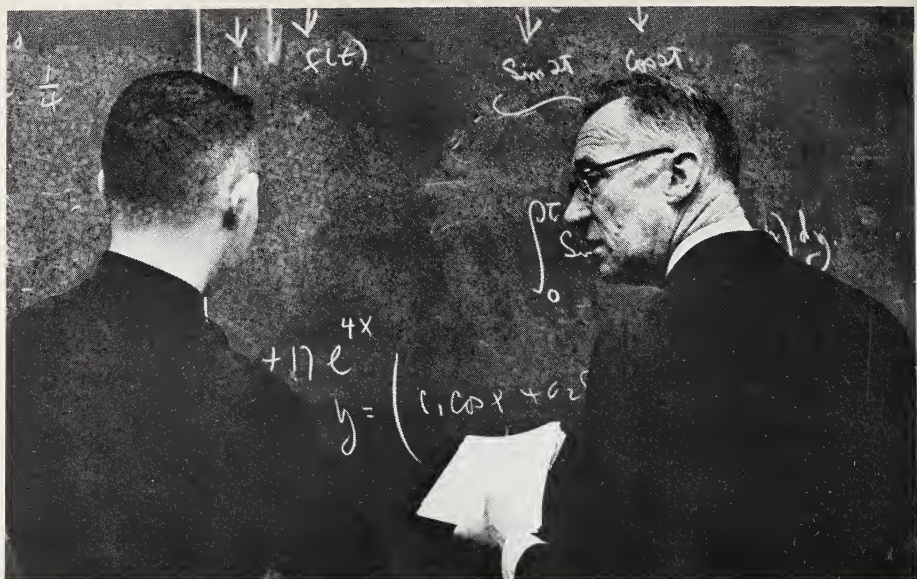
## THE FACULTY

When Commander Buchanan, first Superintendent of the Naval Academy, included three civilian teachers among his seven-man faculty, he founded a policy which has borne the test of more than a century. Today the Naval Academy faculty, which has grown to more than 600, is still an integrated group of officers and civilians in approximately equal numbers. The officers, rotated at intervals of about 3 years, provide a continuing input of new ideas and experience from the Fleet. The civilians provide a core of profes-









*Civilians provide teaching experience . . .*

sional scholarship and teaching experience as well as continuity to the Academy's educational program.

Well over 100 different colleges and universities in the Americas, Western Europe, and the Far East are represented in the backgrounds of the Academy's faculty. Most officer faculty members are naval (or marine) officers, but all the Armed Forces and the State Department are represented. Foreign officers also serve with the faculty through exchange programs, instructing in their native languages and providing midshipmen an early insight into the international aspects of naval life.

Officers and civilian members of the faculty are assigned to academic departments in accordance with their individual backgrounds and talents. For example, the Naval Science and Weapons Departments are staffed largely by officers, whereas civilian members of the faculty predominate in the English, History, and Government Department, and in the Modern Languages Department.

Members of the Naval Academy faculty participate in local and national meetings of educational and professional societies. As scholars and researchers they contribute to the advancement of knowledge in their disciplines. Their work and research are carried out both at home and abroad. This enriched academic background enhances their professional qualifications as leaders and teachers of midshipmen.

A complete listing of Naval Academy faculty, by departments, is given on pages 228 through 257.

## THE SCHEDULE OF INSTRUCTION

The calendar year for each Naval Academy class is divided into two semesters and a summer term. The academic year consists of the first and second semesters, each semester generally consisting of 16 weeks of instruction and 1 week of examination. Midshipmen normally carry about 18 semester hours of academic courses. The normal academic routine provides for 5½ days of recitations, lectures, laboratory periods, and drills each week. Academic days are divided into six periods of 50 minutes, Monday through Friday, and four periods on Saturday morning. During the seventh period in the fall and spring, the Brigade participates in military drill on Monday and a dress parade on Wednesday. An evening study period is provided every evening except Saturday. Some periods during the day are also allocated to study.

The instructional unit is a section of 12-20 midshipmen. These small sections give each midshipman an opportunity to ask questions and to take an active part in classroom discussion. A high ratio of instructors to students normally makes it possible to assign no more than three or four sections to an instructor. Individual attention is thus characteristic of education at the Naval Academy.

## GRADING

In September 1963, the Naval Academy converted its traditional 4.0-based numerical grading system to the letter-grade system wherein individual letter grades of A, B, C, D, and F (A denoting excellent and F, failing) are assigned numerical Quality Point Equivalent (QPE) of 4.0, 3.0, 2.0, 1.0, and 0.0, respectively.

Grades are averaged using a weighted semester hour system called a Quality Point Rating (QPR). The QPR is computed by multiplying the QPE corresponding to the letter grade received in each course by the semester hours of credit for the course and dividing the sum of these products by the total number of semester hours represented by all of the courses taken. A semester QPR is computed only for courses taken during a given semester. A cumulative QPR is maintained for each midshipman. It includes all academic marks assigned to date. This grading system is similar to that used by most colleges and universities. A cumulative QPR of 2.00 or above is required for graduation and commissioning.

An academic probation system provides warning for midshipmen who are not making satisfactory progress toward graduation. If a







midshipman's cumulative QPR is below 2.0 at the completion of a semester, he is placed on academic probation for the following semester. Midshipmen are also placed on probation for the semester following any two consecutive semesters that their semester QPR is below 2.0, even though their cumulative QPR remains above 2.0. In addition, a special letter of warning serves to alert midshipmen whose mid-semester academic records are adjudged not satisfactory.

It should be noted that grades received in aptitude, conduct, and physical education, and for certain professional training conducted during the summer, are not included in the computation of QPR. Satisfactory performance is required, however, and grades are assigned very significant weight in determining class standing.

A midshipman may be recommended for discharge by the Academic Board for failure of one or more required courses, failure to improve sufficiently during a probationary semester, failure to achieve a semester QPR of at least 1.5 for any given semester, and failure to fulfill probationary conditions prescribed by the Academic Board.

On the other end of the grading scale, two honor categories are available to midshipmen. The Superintendent's List honors all midshipmen attaining a minimum of 75 percent of the maximum multiple for the semester (including QPR and grades for aptitude, conduct, and physical education). No grade may be below a "C." Additional liberty is granted to midshipmen on the Superintendent's List.

The Dean's List honors midshipmen with a minimum semester QPR of 3.4 and with no failure ("F") in any academic course or other area, including professional studies, aptitude, conduct, and physical education. These "star men" may be recognized by the gold stars on their lapels.

## THE ADVANCED PLACEMENT PROGRAM

Midshipmen may be authorized to omit courses in the core curriculum which are substantially the same courses they have satisfactorily completed elsewhere before coming to the Naval Academy. This privilege, called "validation," is granted on the basis of review of previous scholastic records and/or an examination by the department which offers the course for which substitution of the validation is sought. Candidates are encouraged to submit results of College Examination Board Advanced Placement Tests as substantiation for validation.

## THE MINORS AND MAJORS PROGRAM

As described under "The Academic Program," all midshipmen are required to take a minor, a selected sequence of six courses (electives) in one of the disciplines shown below. The majority of these programs may be expanded into a major in the same discipline through the completion of additional courses. Minor and major disciplines offered are listed below by department.

Department	Minors/Majors
Engineering Department	Aerospace Engineering Mechanical Engineering Naval Engineering <i>Naval Architecture Option</i> <i>(minor only)</i> <i>Marine Engineering Option</i> <i>(minor only)</i>
English, History, and Government Department	History Literature Foreign Affairs Politics and Economics
Mathematics Department	Mathematics (minor only) Applied Mathematics (major only) Theoretical Mathematics (major only)
Modern Languages Department	French German Italian Portuguese Russian Spanish
Naval Science Department	Oceanography Management Operations Analysis
Science Department	Chemistry Physics Applied Science Electrical Science
Weapons Department	Systems Engineering (Weapons)

Each midshipman is assigned a faculty counselor to assist him in selecting his electives and in planning a profitable and acceptable program for his minor and/or major. Midshipmen validating



*A happy graduate receives his diploma*

previous work are able to substitute advanced elective courses toward a selected major or field of interest. Superior students may, commensurate with their semester QPR, be authorized to carry up to three additional courses ("overloads").

Midshipmen being certified for a major must have a cumulative QPR of at least 2.3 and no grade of less than "C" in the courses making up the major and must be recommended for the major by the appropriate Head of Department.

## REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE

In order to complete academic requirements for the Bachelor of Science degree a midshipman must complete a minimum of 144 semester hours of work. He must complete the courses of the core curriculum (or validate equivalent college-level work), and he must complete one of the 23 minors offered. In addition, he must achieve a cumulative Quality Point Rating (QPR) of at least 2.0 (a "C" average).

In addition to meeting academic requirements for the degree, a midshipman must meet required standards of performance in the



military and professional area, including professional studies, aptitude for the service, conduct, and physical education. The degree of Bachelor of Science is conferred by the Superintendent upon recommendation of the Commandant and the Academic Dean as approved by the Academic Board.

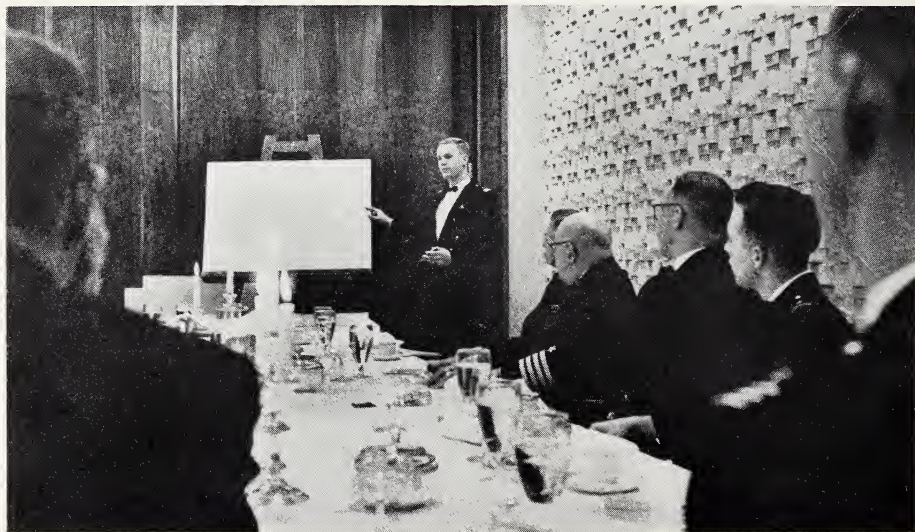
## TRIDENT SCHOLARS

The Naval Academy instituted the Trident Scholar program in 1963 in order to provide a limited number of exceptionally capable students with an opportunity to engage in independent study and research during their senior year. Under this program, midshipmen standing in the top 10 percent of their class at the end of the first semester of their junior year are invited to submit proposed research projects and programs of study for evaluation. Six Scholars were selected in both 1963 and 1964, eight in 1965, twelve in 1966, and sixteen in 1967.

Scholars carry a reduced number of courses, and their research thesis constitutes the major part of their academic program for the year. Each Scholar is assigned a faculty advisor who is well acquainted with the field in which the Scholar is working. Travel in connection with research is fully supported.

The program is guided by a Trident Scholar Committee, composed of faculty members whose primary duty is teaching and who have shown a special interest in scholarship and research. The Scholars, their advisors, the Committee, and invited guests meet periodically at formal dinners for reports of progress by the Schol-

*A Trident Scholar discusses his research*



ars and for critical discussion.

Project titles of the current Scholars are "A Conceptual Design and Feasibility Study of Navy Deep Submergence Vehicles"; "The Effects of Heterogeneous Seeding on the Condensation of Pure Vapor in Nozzles"; "The Design of Automatic Control Systems by Nonlinear Techniques"; "A Method for the Evaluation of Tsunami Energy from Tide Gauge Records Using Comparative Analysis"; "A Joint Study of Political Party Dynamics and Their Relation to Formulation and Change in West German Defense Policy"; "The Propulsion of Slender Swimming Flexible Fish-Like Bodies"; "A Cost-Effectiveness Evaluation of the International Overseas Movement of Goods from the Standpoint of American Maritime Interests"; Sulfur-Containing Ring Derivatives of Phenothiazine as Anti-materials"; "Optical Analyses of Heat and Mass Transfer in a Salt Water Environment"; "A Study of Wind Tunnel Turbulence Measurements"; "Theoretical and Empirical Analysis of Muon Production and Decay in a Neutrino Telescope"; "An Investigation of Unsteady Solution of the Three-Dimensional Vortex Flow"; "An Investigation of the Flow and Resistance Characteristics of a Long, Slender Hull"; "Numerical Studies of the Diffusion-Transport Approximation"; and "A Comparison of Random Signal Analysis Techniques for Turbulence and Flow Noise Measurements."

## THE EVENING LECTURE PROGRAM

Midshipmen of the three upper classes are afforded an opportunity to broaden their knowledge and outlook through an evening lecture program. Lectures concern the fine arts, world affairs, science, and engineering. Lecturers have included such distinguished gentlemen as Dr. John Ciardi on poetry; Dr. James A. Van Allen on the magnetosphere; Mr. Paul Hume on music; Dr. Wernher von Braun, Mr. James E. Webb, and Mr. Kraft A. Ehricke on space; Dr. Howard Mitchell on music; Dr. Harlow Shapley on astronomy; Dr. H. L. Shapiro on anthropology; and Dr. W. Maurice Ewing on ocean research.

## IMMEDIATE GRADUATE EDUCATION PROGRAMS

Under the Immediate Master's Program, now in its second year, midshipmen who have completed requisite graduate-level studies at the Academy as undergraduates may be selected to continue their studies at graduation to the master's level at participating

civilian universities or at the U. S. Naval Postgraduate School in Monterey, California.

Master's degrees are attained in 9-12 months under this accelerated program. The initial group of thirty-nine graduates undertook studies in mathematics and in mechanical, naval, and aerospace engineering. Plans for the second year include the addition of electrical science, physics, chemistry, applied science, operations analysis, economics, management, and weapons engineering to the areas of study. About eighty graduates will be participating in the second year of this program.

Other graduates proceeding directly to graduate studies each year include midshipmen selected for Atomic Energy Commission Awards, Daedalian Fellowships, and Churchill, Fulbright, Guggenheim, National Science Foundation, Olmstead, and Rhodes Scholarships.

## NAVAL ACADEMY FOREIGN AFFAIRS CONFERENCE

Now an eagerly awaited April event, the annual 4-day Naval Academy Foreign Affairs Conference has been an unqualified success since the initial Conference in 1961, when the subject was "United States Foreign Policy in Africa and the Middle East." Most recently, in 1968 when the subject was "Africa and the Middle East," this key and complex area in world affairs was again the Conference focal point.

At these conferences, distinguished civilians, military leaders, representatives of the U.S. Department of State, and ambassadors and other senior foreign diplomats and embassy personnel, join with midshipmen of the Naval Academy's Foreign Relations Club and with student representatives from more than 100 colleges and universities in a detailed study of U.S. foreign policy in the area selected for discussion. Keynote speakers are distinguished leaders in their respective fields.

Conferees are divided into groups for roundtable discussion of subareas. Roundtables are moderated by an adult specialist in the subarea. To provide additional background to conferees and to assist them in their discussions, conference schedules include addresses in plenary session and a panel discussion, all by outstanding figures. In addition, ambassadors or other ranking diplomats discuss their country's views with each roundtable.

Resolutions adopted by each are designed to deal effectively with U.S. foreign policy problems in their subarea. Deliberations





NAFAC. From over one-hundred colleges and universities . . .

culminate in a final plenary session in which these individual resolutions are debated, amended, and adopted.

Conferences are planned and organized by midshipmen of the Naval Academy's Foreign Relations Club under a Director from the faculty and assisted by members of the faculty of the English, History, and Government Department. Financial support is provided by private foundations and corporations.

## INVITATIONAL DEBATE TOURNAMENT

In February 1968 the United States Naval Academy Forensic Activity hosted the Academy's tenth annual Invitational Debate Tournament, long considered by many universities as a highlight of their debate year. Sixty-four of the nation's top debate teams, representing every geographical region of the country, participated in the tournament, debating the national topic: "Resolved: that the Federal Government guarantee an annual minimum cash income to all citizens."

## THE LIBRARY

The Naval Academy Library provides broad support to the academic program. In addition to support for the Academy's scientifically oriented curriculum, the Library includes strong sections of basic works of reference and periodicals and source materials in history and literature and in the humanities generally. The Library is especially rich in military source material and has assembled one of the largest collections of naval books in the United States.



View of Brigade Library

Midshipmen make extensive use of the Library for study and research and for recreation. Convenient facilities for the use of microfilm and other miniaturized textual reproductions for reference are available. The Main Library is located in Mahan Hall, with a nearby Annex for government documents, periodical holdings, and back files. Also nearby, in Isherwood Hall, is the Science-Technology Library. Construction of a new and expanded library has been approved under the Academy's current building program.

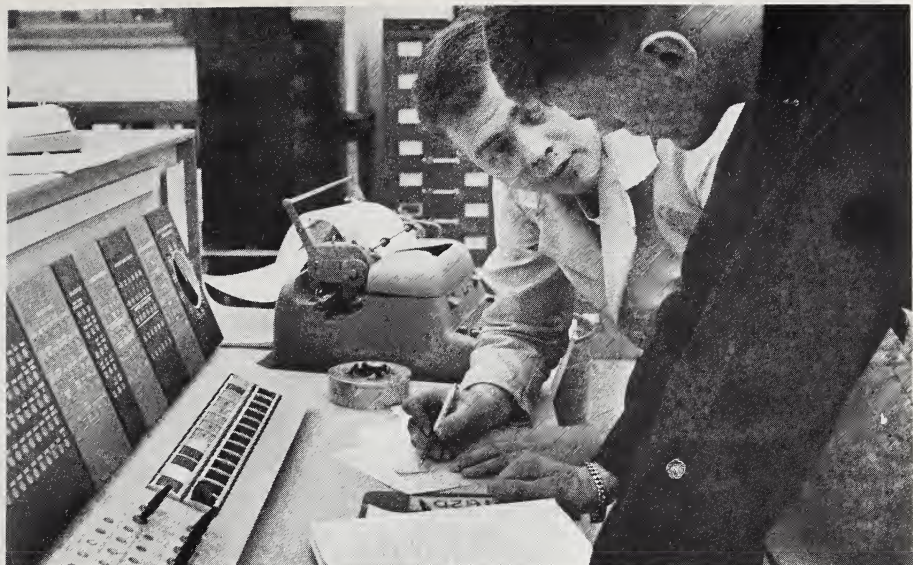
The Brigade Library, located adjacent to Bancroft Hall, is a recent and handsome addition to Academy library facilities. Open nightly until midnight, it contains a selected collection of books and magazines, excellent taping and playback equipment for recorded sound and music, and extensive display cases for special exhibits.

### THE ACADEMIC COMPUTING CENTER

The Academy's Academic Computing Center is playing an increasingly vital and sophisticated role in education at today's Naval Academy. In addition to the wide range of computer services available within the Center, services from the Center and from GE time-sharing computers in Washington, D. C., are available at each of the Academy's academic departments through remote terminals.

Computer usage ranges from the computation of an assigned classroom problem to the support of special research projects of the Center and of midshipmen and faculty. Expertise and guidance





*Instruction in the Computing Center*

are provided to departments and to individual users by personnel assigned to the Center.

To provide midshipmen and faculty with the maximum hands-on time, the Center has two general-purpose computer systems, an IBM 1130 system and an IBM 1620 system. Both are equipped with disc storage to allow for a full range of library and utility routines. The primary language is FORTRAN, although machine language assemblers are available.

Three separate research projects involving educational technology are currently underway at the Naval Academy. The most recent and extensive is a pioneering multi-media research effort financially supported by the U. S. Department of Health, Education, and Welfare. Under this three-year project, the Academy has contracted with industry for the design, development, fabrication, installation, and validation of three pilot college-level courses using a multi-media approach: General Physics, Economics, and Leadership. Faculty and midshipmen and personnel of the Academic Computing Center are participating. The full spectrum of media will be coordinated: computers, programmed instruction, closed-circuit TV, movies, slides, audio, written materials, laboratories, and lectures. This far-reaching project holds great promise not only for the advancement of educational technology at the Naval Academy but, of greater significance, for the advancement of American education, generally.

A second project under development and evaluation at the Acad-





ain Library steps




emy involves the use of remote teletypes by students for computer-assisted instruction. Teletype units, installed in an experimental 10-man classroom and in a number of other academic areas, are connected to a time-sharing GE computer in Washington, D. C. Currently limited to science and engineering courses and a relatively small sampling of midshipmen, the area of investigation includes classroom and laboratory calculation, stimulation, dialogue, diagnostics, and drill and practice exercises of instructional materials.

A separate approach to computer-assisted instruction is under investigation in a third project, utilizing the Academy's IBM 1500 computer and a multi-terminal, 12-station, experimental computer classroom. Again, a limited number of students are involved. Courses under development by faculty, systems analysts, and programmers include Thermodynamics, Modern Physics, and Electrical Science.









## The Military and Professional Program

### THE COMMANDANT OF MIDSHIPMEN

The Commandant of Midshipmen commands the Brigade of Midshipmen. He develops its character; endeavors to instill the highest ideals of duty, honor, and loyalty; provides military indoctrination and physical development; and inculcates midshipmen with the high standards of performance required of midshipmen and officers of the Naval Service. In carrying out these responsibilities, the Commandant coordinates the functions of the Executive, Physical Education, Medical, Dental, and Midshipmen Supply Departments.

### THE EXECUTIVE DEPARTMENT

Headed by a senior naval officer, officers of the Executive Department work directly with the Brigade. Assigned duties in Bancroft Hall as battalion, company, and staff officers, they work and live in close daily contact with the midshipmen. Here by precept and example, the application of sound techniques of leadership, counsel and guidance, and, when required, corrective or disciplinary

action, the midshipman is measured, molded, and motivated for the day when he will join the Fleet as an officer worthy of those who have gone before him.

#### THE BRIGADE AND THE MILITARY PROGRAM

The military and professional programs at the Naval Academy set it apart from most other institutions of higher learning. Designed to produce naval officers and not just college graduates, the Academy has a broader mission. True, a sound education is an essential goal, but also essential in the evolutionary process of producing naval officers is the development of character, professional knowledge, leadership ability, motivation, moral strength, and physical skills and stamina. Thus, challenging and greatly rewarding in many ways, life at the Academy is purposeful, disciplined, and military.

For purposes of military training and administration, the 4,200-man Brigade of Midshipmen is divided into two regiments, each divided into three battalions. The six battalions are each divided into six companies. Midshipmen of all four classes are assigned to each basic military unit. The company is the basic unit for numerous competitive activities during the year.

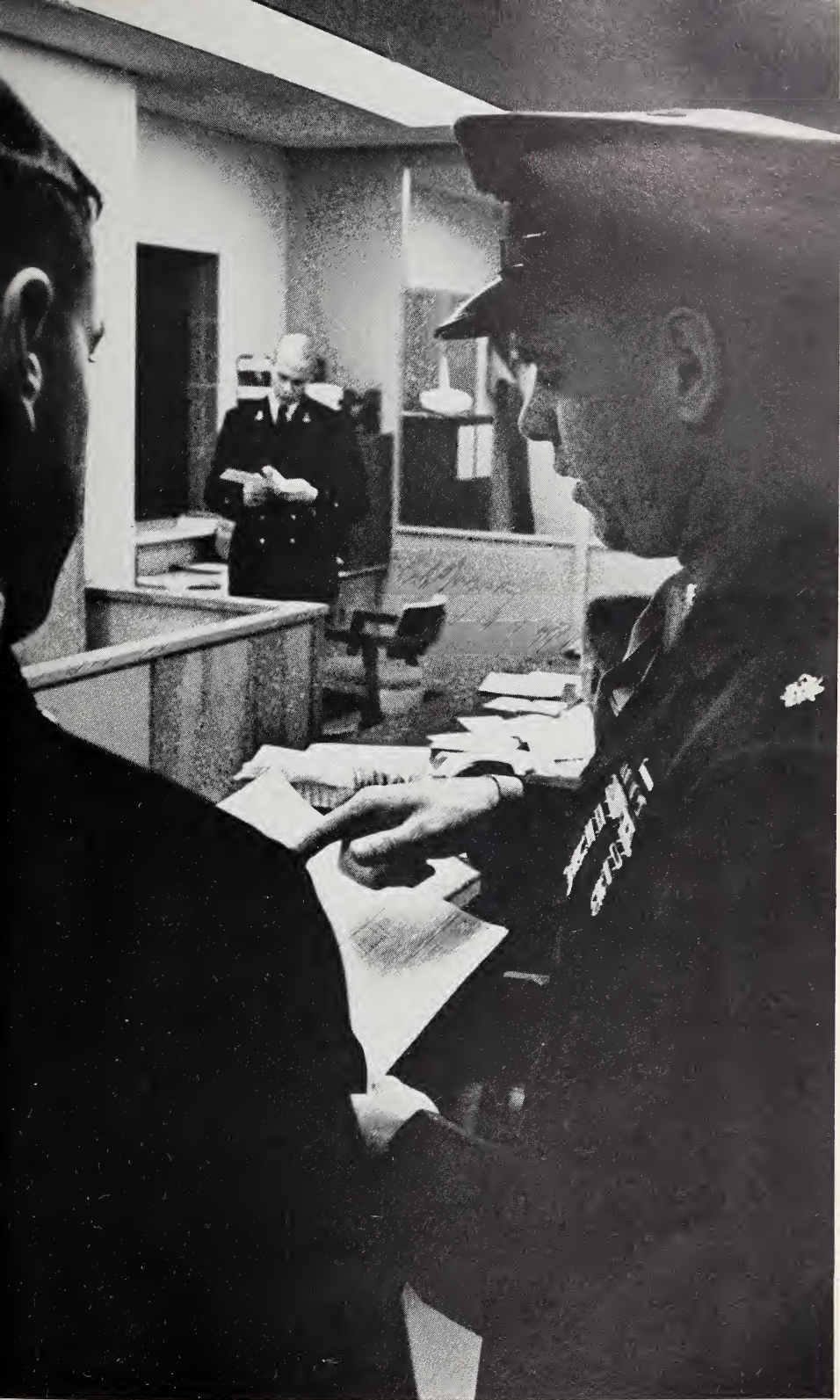
Each of these military units from the Brigade down to the 36 companies and their subordinate platoons is under the command of a First Classman, assisted by his midshipman staff and assistants. Midshipmen are selected by officers of the Executive Department for these commands and staffs in recognition of their leadership and officer-like qualities.

#### THE HONOR CONCEPT

The Naval Academy Honor Concept is broad and general rather than specific and detailed in nature. It is predicated on the belief that each midshipman must, based on guidelines or principles, learn to make his own decision about what to do or say in any situation. Honor Concept principles are:

□ A midshipman will not lie, cheat, or steal, nor will he mislead or deceive anyone as to known facts. A midshipman will be truthful, trustworthy, honest and forthright at all times and under all circumstances.

□ Every midshipman is presumed to be honorable at all times and to possess moral integrity in the fullest sense and will be treated accordingly, unless he proves otherwise by his words or actions.



*Midshipmen watchstanders learn under expert supervision*



□ A midshipman should neither permit nor accept anything which is not just, right, and true. He should do the right thing because it is right, not because of fear of punishment.

The Naval Academy Honor Concept further defines violations of these principles by lying, cheating, stealing, or misleading or deceiving, as intentional and deliberate acts.

The above guidelines should be the basis for a midshipman's conduct in all places and under all conditions, whether official or personal in nature. The Honor Concept is therefore an all-pervading way of life rather than a set of regulations for which violators will be punished.

In that the Honor Concept is a *concept*—with broad and general guidelines or principles rather than a code of specifics—an individual moral responsibility becomes the personal obligation of every midshipman. Each midshipman, therefore, must know and understand the need for the Honor Concept, its principles, and its application. Then, in the situations which he encounters daily, he should, by conscious deliberation or by force of habit, make the decisions or take the actions that are consistent with Honor Concept principles.

The Honor Concept is the responsibility of the Brigade of Midshipmen. It is administered through a Midshipmen Honor Organization of elected officials from each class who are charged with both Brigade indoctrination and the processing of honor violations. Emphasis is on indoctrination, with a minimum of one seminar or discussion per month conducted by honor representatives in each company utilizing a Brigade-wide outline. However, violators of the Concept, if found guilty by the Midshipmen Honor Organization and so reported to the Commandant of Midshipmen, may be recommended for separation from the Naval Academy.

A dishonorable act must not be excused because of "classmate or unit loyalty." A midshipman observing another in a dishonorable act may report the incident to the Midshipmen Honor Organization directly, or he may prefer to reaffirm his observations and gain the offender's viewpoint through personal questioning prior to reporting him, or choose to caution the offender personally. A midshipman who observes an honor offense and does not take any of the above actions, has not been dishonorable and committed an honor violation himself, but he has failed in his responsibility to the Honor Concept and to the Brigade.



#### PLEBE INDOCTRINATION

The incoming midshipmen are officially designated Fourth Classmen, but are colloquially known as "plebes." In succeeding years they become Third Classmen or "youngsters," Second Classmen, and finally, in their senior year, First Classmen.

The new plebes undergo an intensive program of military training and indoctrination from their first day at the Academy, which continues unabated until the end of Plebe Year the following June. During this period they learn early that they are senior to no one and junior to all, so that the "advice" comes from all directions and in many forms.

Known as "plebe indoctrination," the primary objective of this system is to speed the transition from civilian to military life and thus provide a base for rapid development of the attributes re-





Evening Formation



quired of a naval officer. The indoctrination includes watch standing, drills, inspections, instruction and, where necessary, discipline.

Plebe Year is tough. It is a deliberate period of testing, requiring midshipmen to stand on their own two feet, to produce under pressure, to respond promptly and intelligently to orders and, finally, to measure up to high standards of character, honor, and morality. Plebe indoctrination is administered by midshipmen of the First Class, assisted by the Second Class, and closely supervised by officers of the Executive Department.

#### WEEKLY ROUTINE

The weekly routine for a midshipman gets off to a rousing Monday-morning start with 6:15 reveille. Thirty minutes later, shaven and smartly dressed, he is undergoing his first inspection of the day at breakfast formation. After breakfast he straightens up his room and gets ready for his 7:55 class, beginning a day of recitations, drills, laboratory work, recreation, and study.

Morning classes end at 11:45 and the midshipman gets ready for noon meal formation, a daily military highlight. Shoes are sparkling, gold is shining, and uniforms are brushed and smartly pressed.

Following lunch and a few moments of relaxation or last-minute study in his room, the midshipman departs for his 1:15 class. Classes end for the day at 3:05. Shortly thereafter uniforms have disappeared, and a frenzy of activity seems to erupt simultaneously at athletic fields, gymnasiums and other indoor athletic facilities, on nearby waters of the Severn River and Chesapeake Bay, and at extracurricular facilities . . . literally at every point of the compass. Easily the best part of the day for most midshipmen, this activity is ended too quickly by the 6:30 evening meal formation.

Following the evening meal and a brief period for relaxation, studies resume for the remainder of the evening. Taps sounds at 10 p.m. during the week, but studies may continue for limited periods until "lights out." Infantry drills and dress parades are held on Monday and Wednesday afternoons during fall and spring. Thus go Monday through Friday, a lot of fun and a lot of work.

Saturday morning classes are followed by noon formation, accompanied by a rigorous inspection marking the end of the academic week. All midshipmen have liberty in Annapolis on Saturday afternoon, but many prefer to watch or participate in athletics, to sail, or to enjoy other recreational activities.

Midshipmen First, Second, and Third Class also have liberty in Annapolis on Saturday evening. Some midshipmen attend the

movie in Mahan Hall (upperclassmen may bring dates). Many upperclassmen attend the scheduled "hop" or dance. Hops vary from formal during such times as June Week, Homecoming Weekend, and Christmas, to informal. Music is provided by the Academy's U.S. Navy Band and, on less formal occasions, by midshipman bands.

Midshipmen attend church services on Sunday morning, either in the Naval Academy Chapel or the church of their choice in Annapolis. Sunday afternoon offers more liberty in Annapolis for the three senior classes. In addition, there is another movie in Mahan Hall. Again, upper classes may attend with their dates. Midshipmen are free to show guests around the Naval Academy and are frequently found escorting family, friends, or best girl.

#### THE DEVELOPMENT OF LEADERS

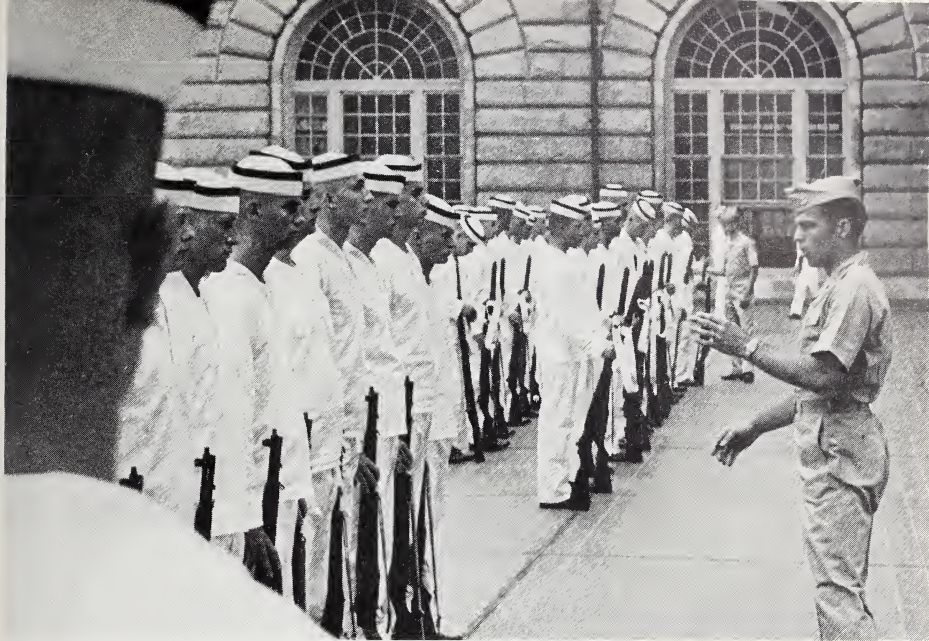
Leadership is both an art and a science. There is no doubt that some men have more flair for leadership than others. At the same time, the basic principles of good leadership are well known and long established. Thus, properly instructed and trained, every man can become a more effective leader. The 4 years at the Academy provide each midshipman with the basic knowledge, guidance, motivation, and experience to become an effective leader. It all starts the first day . . .

#### *Plebe Year*

The first day of Plebe Summer is one that most midshipmen remember for many years. This is not surprising. In one short day civilians have become midshipmen. They are given haircuts, issued uniforms, taught the basics of marching, and eat their first meal in the 4,200-seat midshipmen's messhall. Their military indoctrination has gotten off to a running start. But they are too busy to worry about it. Civilian ways and days soon seem far behind.

As the summer progresses, the new midshipmen rapidly assimilate basic skills in seamanship, navigation, and gunnery. Infantry drill, firing an M-1 rifle under the supervision of U.S. Marines, sailing navy yawls, and cruising in yard patrol craft make the midshipman a proudly versatile young man. Spirit and a desire to win are developed through competition in a wide range of activities, including boxing, dress parades, seamanship, and talent shows.

Plebe Summer is completed in late August with Parents' Weekend, at which time parents of the new midshipmen have the oppor-



*You can't do it all the first day . . .*

tunity to visit the Academy and observe their sons' progress. A dress parade "officered" by the new plebes, exhibitions in sports, and the opportunity to go sailing with their sons go far to assure parents that their sons are taking their new life as midshipmen in stride.

September arrives. Upperclassmen return from at-sea training, leaves, and other summer activities. The academic year gets underway. A long 4 years of study, hard study, lie ahead. Plebe Summer is over, but plebe indoctrination continues.

September also brings the excitement of football and other fall sports. During the football season, selected units of the Brigade travel to away games. The entire Brigade goes to home games, and to the Academy's favorite, the season-ending Army-Navy game in Philadelphia.

Christmas brings a 2-week leave. Leave provides the first chance plebes have had to visit their homes since entry in June, as well as a welcome break in the academic routine for all midshipmen. Classes resume in early January, followed by semester-ending examinations late in the month. This is followed by a 3-day period of leave and the start of the second semester. A final 3 days of leave breaks the academic routine during the spring.

The approaching end of Plebe Year brings mixed emotions. A feeling of relief that it is almost over is surely one. At the same



*The end  
of Plebe Year*



time there are well-deserved feelings of confidence and pride that the test has not proven too great. Mystery is turning to mastery.

Graduation is at one time both the high point and the ending of June Week. It is also the time decreed by tradition that the plebes must place a cap on the very top of the tall polished marble spire of the Herndon Monument. This they do with a vengeance! The resulting spirited once-a-year activity at the monument provides a memorable sight for startled spectators.

### *Third Class Year*

With the placing of the cap, the intensive first year of indoctrination is ended, and the new Third Classmen get ready to depart on

two months of at-sea training, accompanied by midshipmen of the First Class. Sea training is followed by 30 days of well-earned leave.

The sea training introduces the midshipman to navy life at sea. He meets and learns to respect the Navy's enlisted men upon whom he will later depend as an officer. He serves in many capacities and actively participates in a wide range of shipboard evolutions. He lives and works as an enlisted man, performing routine ship's work, standing deck, gunnery, operations, and engineering watches, operating ship's boats, and exercising at general shipboard drills. He masters the required practical factors for the basic enlisted rates of seaman and fireman.

With the completion of at-sea training and summer leave, Third Classmen return to the Academy and begin their second academic year. Militarily, a Third Classman finds himself somewhat in between. He is too senior to be subject to plebe indoctrination and too junior to assist. Thus, although the new year brings him more responsibilities in infantry drills and in watch standing, the lessened emphasis on indoctrination leaves him more time for sports and other extracurricular activities. It's a welcome change.

Following the completion of academic study for Third Class Year, and their second June Week, the Third Classmen become Second Classmen and begin an interesting summer of professional studies, training, and indoctrination and 30 days of leave.

### *Second Class Year*

During the summer, the Class undertakes professional studies at the Academy, operational familiarization and flight instruction in the control of naval training aircraft at naval air stations in Florida, and submarine training at New London, Connecticut. Thirty days of summer leave provide a welcome change of pace. Summer training ends with amphibious training at the Atlantic Fleet's Amphibious Base at Little Creek (Norfolk), Virginia.

As the Second Class midshipmen return to the Academy to begin their third academic year, still more military responsibilities are realized. Second Class midshipmen officers are selected and trained to direct the Brigade during periodic absences of the First Class. They are assigned more-demanding watches. An important role in the indoctrination of the new Fourth Class is undertaken by the Second Class. In addition to contributing to the development of the Fourth Classmen, this responsibility makes a vital contribution to the Second Classman's growth as a leader. There is little time





Summer at-sea training

for watching the calendar. And, before long, another June Week has come and passed and First Class Year is underway.

#### *First Class Year*

During his last summer as a midshipman, the new midshipman First Class again participates in at-sea training. He stands the watches and performs the duties of a young naval officer and is exposed to the social courtesies, amenities, and customs of ward-room life aboard ship. Training programs consist of work in navigation, watch standing on the bridge and in Combat Information Center, and lectures and studies required to complete his *Journal of At-Sea Training*. In addition, he learns the duties of a junior engineering officer by standing watches throughout the engineering department and by exercising the responsibilities of an engineering division officer.

Normally, midshipmen train at-sea in foreign waters and thus are able to enjoy visits to a number of foreign ports. In 1967, training units visited such places as Japan, Hong Kong, and Hawaii in the Pacific; Naples, Athens, and Gibraltar in the Mediterranean; and Oslo, Portsmouth, Stockholm, Copenhagen, Hamburg, and Kiel in Northern Europe.

The important responsibility assigned the First Class for directing the Brigade has been noted. Midshipmen officers lead the Brigade in parades, ceremonies, and at daily formations. They are responsible for the conduct, military smartness, and competitive records of their units. They are in charge of the midshipman watch organization in Bancroft Hall. Selection of three sets of midshipman officers during the year increases the individual opportunity for





this valuable leadership experience. The third or final set of "stripers" is selected by the Commandant from the most capable midshipmen in the first two.

In attempting to carry out these demanding responsibilities, the First Class midshipman finds himself calling upon all the indoctrination and leadership principles he has accumulated during his first 3 years. Thus, following this final year of practical experience, graduation finds him well-prepared to assume his leadership responsibilities in the Fleet as a newly commissioned officer.

#### THE PROFESSIONAL TRAINING PROGRAM

The Commandant directs the Academy's professional training program. Designed to provide graduates with a sound foundation in the fundamental, specialized knowledge and skills required of a professional Naval Officer, the program encompasses a wide range of professional instruction, training, and drills.

Over 2,000 hours of instruction are devoted to providing this foundation during a midshipman's four years at the Academy. The professional training program is closely monitored, and a midshipman's performance contributes very significantly to his class standing at graduation.

Included in the program are formal courses of instruction, practical training, physical education, lectures, and a variety of evolutions and drills in which the midshipmen "learn by doing." Progressing from basic military and naval knowledge to the presentation of more advanced information and concepts, the program supports and complements both the military life within the Bri-



*Taking a bearing*

gade and the professionally oriented academic courses. Thus, the Academy's professional program makes a vital contribution to the development of graduates with sound potential for future growth in the naval profession. A description of the courses, drills, and training making up the professional program begins on page 197.

#### LEAVE AND PRIVILEGES

The amount of personal freedom and privilege granted a midshipman varies directly with his seniority and the degree of his authority and responsibility. A First Classman will not only have more responsibility in the administration of the Brigade but also more privileges. Midshipmen proficient in academic work and military aptitude also are rewarded with extra privileges.

There are several regular periods of leave of absence from the Academy during the year. These include Christmas leave, a period of about 2 weeks; end-of-term leave, a 3-day weekend break at the end of the first term in January; spring leave, a period of 3 days, usually in late March; and the month-long summer leave for the three upper classes.

In addition to leave of absence, midshipmen are granted liberty in the Annapolis area. Like all other privileges the amount varies with seniority and responsibility. Fourth Classmen are granted liberty on Saturday afternoons and dining-out privileges with relatives and close friends on Saturdays and Sundays. They are permitted to escort young ladies on three occasions and during June Week.

First, Second, and Third Class have liberty on Saturday afternoon and evening, and on Sunday afternoons. In addition, Second Class rate liberty on Wednesday afternoons and First Class rate liberty Friday evenings plus every afternoon. Weekday liberties begin after classes are completed for the day.

Limited numbers of weekend liberties are granted to upperclassmen. Midshipmen Third Class may take one weekend of leave each semester, Second Class midshipmen receive two each semester, and First Class receive four each semester. Additional weekends may be granted to midshipmen for noteworthy academic or other achievement.

### PHYSICAL EDUCATION

In supporting the mission of the Naval Academy, the program of the Physical Education Department makes a vital contribution to the physical development of midshipmen. The program continues throughout the 4 years. All midshipmen participate.

The program's aims for each midshipman are to develop skill, strength, confidence, teamwork, endurance, agility, and competitive spirit; to develop useful habits of physical fitness; to develop the capability to train and instruct others; and to develop the knowledge and capability to withstand physical hardship. Equally important, the program aims to be enjoyable, to provide a "release" from the academic routine, to develop a lasting appreciation for sports in general, and to develop individual skills in "carryover" sports for enjoyment after graduation.

Things get off to a fast start Plebe Summer. Preliminary testing of posture, swimming capability, and general athletic ability is followed by instruction and indoctrination drills in boxing, wrestling, lacrosse, fencing, soccer, gymnastics, crew, golf, tennis, squash, racketball, volleyball, and track.

The pace continues during the first academic year. More-advanced instruction is given in badminton, soccer, swimming, boxing, wrestling, gymnastics, golf, tennis, and volleyball. In addition, midshipmen are introduced to basketball, handball, and bowling, and are tested in applied strength, agility, swimming, boxing, wrestling, and gymnastics.

The final 3 years follow up basic instruction and physical tests of the first year with increasingly advanced instruction and more-demanding tests. Personal conditioning, athletic administration, and hand-to-hand combat are added to the area of instruction.





Rotunda, Bancroft Hall

For a more detailed description of the Physical Education Department, its mission and facilities, see page 202.

#### MEDICAL AND DENTAL CARE

The finest medical and dental care is provided midshipmen by the Navy. Facilities in Bancroft Hall are extensive and up-to-date. Daily sick calls and periodic physical and dental examinations help keep the Brigade in excellent health. If hospitalization is necessary, there are the more-complete facilities of the U.S. Naval Hospital located at the Academy as well as those of the nearby U.S. Naval Hospital at the world-famous National Naval Medical Center in Bethesda, Md.

#### BANCROFT HALL

All of the basic facilities needed for daily living and many for recreation are found in Bancroft Hall. Press shops provide rapid service on midshipman uniforms which the tailor shops keep fitted and repaired. Barber shops manage nearly 4,000 haircuts every week. The Midshipmen's Store provides daily necessities and the place to buy an occasional gift. There are Chaplains' offices with small adjoining Protestant and Catholic Chapels.

The entire Brigade dines together in the spacious and modern Midshipmen's Messhall. Here, midshipmen demonstrate their enthusiasm for the appetizing, freshly prepared meals by taking a 4000-calorie daily diet in stride.

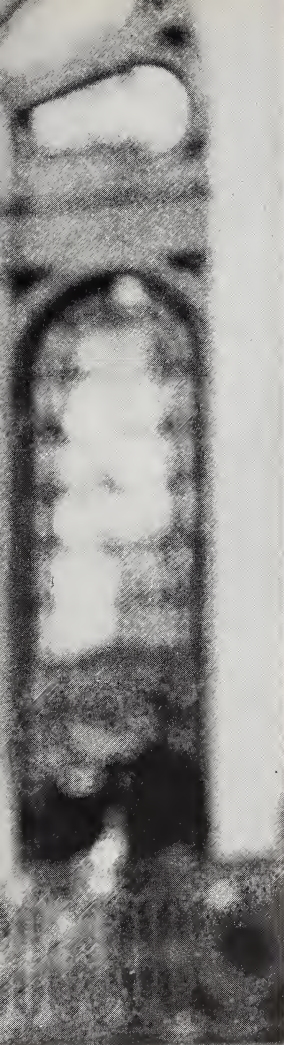
Laundry and drycleaning services are provided. There is a cobbler shop, a post office, a library, an assembly hall, a bookstore, and the midshipmen's radio station. For recreation, there are bowling alleys, squash courts, recreation rooms, clubrooms, a photo laboratory, and a band room. And there is a language laboratory. On weekends, Memorial Hall and Smoke Hall provide attractive settings for dancing and the Steerage, or soda fountain, offers an area where midshipmen may relax with their dates.











## Religious Activities

It is no mere coincidence that the beautiful dome of the Chapel at the U.S. Naval Academy rises above, and dominates, all other buildings in the Yard. Nor is it by chance that the Chapel was placed centrally in planning the buildings as they now stand. This is fitting, since our country was founded on religious principles, cherished by all faiths, which are the foundations of our ideals of freedom and responsibility.

The present Chapel was completed in 1908. An addition was dedicated in 1940, increasing the seating capacity to 2,500 and changing the basic design of the Chapel from that of the Greek Cross to that of the Roman Cross. The much smaller St. Andrew's Chapel is located directly beneath the Main Chapel.

Because we are "one nation, under God," it is most appropriate that the midshipmen who will some day become the leaders of our Navy should regularly attend Divine Worship Services. Thus, all midshipmen of the Roman Catholic faith attend Mass in the Chapel. Midshipmen of the various Protestant denominations attend the Protestant Chapel Service or the church of their choice



in the city of Annapolis. Midshipmen of the Jewish and Greek Orthodox faiths attend synagogue or church in Annapolis.

During the half hour preceding the 10:30 Morning Worship, the Naval Academy Band gives a concert in front of the Chapel. As time for services draws near, the Brigade of Midshipmen marches to Chapel to the music of the band, to be greeted and reviewed by the Superintendent and his official party on the Chapel steps.

The services, both Catholic and Protestant, are enhanced by the stately beauty of the Chapel. The Protestant worship service is interdenominational, having gradually evolved from the time of the Academy's founding into its present form.

Both services begin with the parading of the Ensign and the Brigade Flag to the altar where they are dipped to the Cross, signifying our allegiance to God. This is followed by the choir marching to the chancel.

In the Protestant service, the Chapel Choir is joined by the Antiphonal Choir in the balcony. These combined choirs number approximately 300 midshipmen. The prayers, responses, and creeds are those used by Christians through the ages, but there are special Naval and Naval Academy prayers including the following Midshipmen's Prayer:

*Almighty Father, whose way is in the sea, whose paths are in the great waters, whose command is over all and whose love never faileth: Let me be aware of Thy presence and obedient to Thy will. Keep me true to my best self, guarding me against dishonesty in*



*purpose and in deed, and helping me so to live that I can stand unashamed and unfriaried before my shipmates, my loved ones, and Thee. Protect those in whose love I live. Give me the will to do the work of a man and to accept my share of responsibilities with a strong heart and a cheerful mind.. Make me considerate of those intrusted to my leadership and faithful to the duties my Country has intrusted in me. Let my uniform remind me daily of the traditions of the Service of which I am a part. If I am inclined to doubt, steady my faith; if I am tempted, make me strong to resist; if I should miss the mark, give me courage to try again. Guide me with the light of truth and keep before me the life of Him by whose example and help I trust to obtain the answer to my prayer, Jesus Christ our Lord. Amen.*

Sunday Catholic Mass is said in the Main Chapel at 8 a.m., with High Mass on the first Sunday of every month. A choir of approximately 150 midshipmen sings at the Sunday Mass.

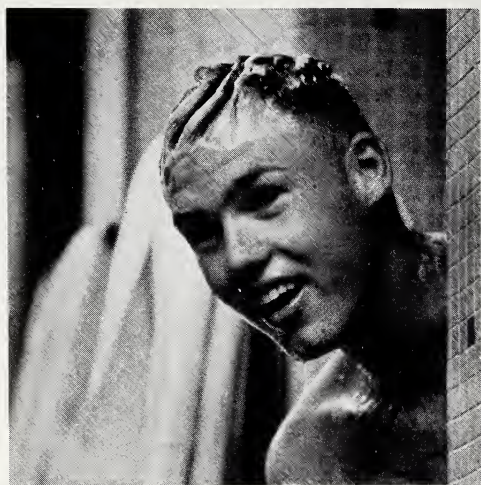
Protestant Holy Communion services are held periodically during the week at 6 a.m. and on Sunday morning at 9 a.m. in St. Andrew's Chapel. At 5 p.m. on Sunday evening, a brief informal service is conducted with midshipmen participating. The Naval Academy Christian Association meets on the first and third Sunday evenings of the month in Bancroft Hall. A Bible discussion group meets weekly and there is a Sunday school for children of civilian and military personnel taught by midshipmen. At Christmas time the Protestant Choir is joined by the Hood College Girls' Choir and professional soloists in presenting Handel's "Messiah."

For Catholic midshipmen, Mass is said daily in Bancroft Hall, Monday through Saturday. Confessions are heard daily before Mass and on Saturday afternoon and evening. The Newman Club meets on the second and fourth Sundays to discuss various dogmas of faith and aspects of the Church in the modern world. Guest speakers are featured. An annual Lay Retreat is sponsored by the Club.

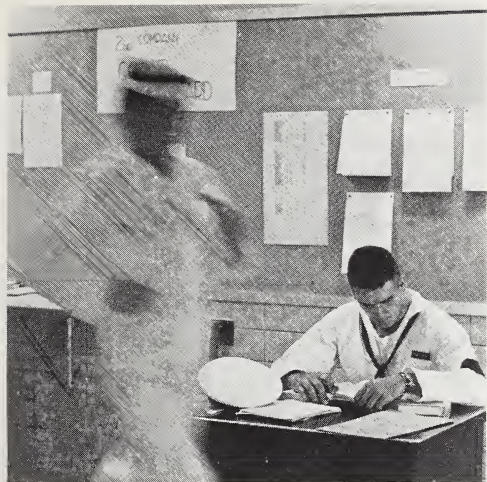
Protestant and Catholic services are held each Sunday at the Naval Academy Hospital, and periodic visits are made to the patients.

Chaplains are always available for counseling at their offices in the Chapel and in Bancroft Hall. They welcome the opportunity to meet with parents and join them in the hope that the faith of their sons will grow and flourish during their time as midshipmen at the Naval Academy.

## LIFE OF A MIDSHIPMAN

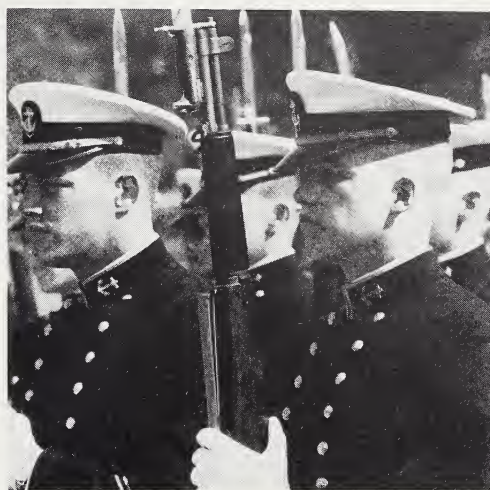












URYHALL







## Departments and Programs

Following is a brief description of each of the Academy's seven academic departments. Included are faculty, mission, facilities and academic programs, as well as a listing of course descriptions for each department.

Courses are represented by a letter prefix followed by a three-digit number. The letter prefix identifies the department offering the course. All core courses begin with number 1, 2, 3, or 4. With minor exceptions, the first digit of a core course indicates the year offered; i.e., 1 the first (fourth class) year, 2 the second year, etc. Electives, with minor exceptions, begin with any number from 5 through 9. Seminar and research-type courses begin with a "9." Letter suffixes used with modern language courses are self-explanatory.

## ENGINEERING DEPARTMENT

**Head of Department:** Capt. R. W. King; **Executive Officer:** Commander R. W. Lancaster; **Senior Professor:** R. D. Mathieu; **Professors:** R. M. Johnston; A. E. Bock, M. K. Jovanovic, W. J. Battin; **Commanders/Lieutenant Colonels:** R. C. Rowley, R. W. Lancaster, J. W. Organ, R. R. Goldner, D. W. Mathews, J. B. Poland, J. M. Cockey (USMC); **Associate Professors:** W. F. Eckley, J. H. Smith, R. F. Latham, W. A. Barr, V. J. Lopardo, F. L. Smith, A. M. Alwan, J. E. Losure, H. C. DeMart, R. A. Granger, B. H. Rankin, W. M. Lee, E. E. Dodson, B. Johnson, A. A. Pouring, V. V. Utgoff, J. A. Adams, R. W. Werlwas, B. H. Carson, J. P. Uldrick, P. R. Van Mater, D. F. Rogers, R. A. Hirsch; **Lieutenant Commanders/Majors:** C. P. Hary, R. E. Goodspeed, J. D. Kertz, R. A. Kelley, N. A. Deam, J. V. Jolliff, D. B. Reynolds, H. E. Robertson, K. P. Garland, R. A. Lowery, B. A. Wilcox, C. E. Giese, Jr., B. W. Welles, M. D. Tuft, J. K. Williams, E. R. Kuhn, J. R. Groves (USA), J. M. Willmarth (USMC); **Assistant Professors:** L. M. Billow, W. B. Huckenpoehler, P. F. Wiggins, W. H. Schulden, T. D. Clark, C. O. Heller, H. H. Keith, J. O. Geremia, K. F. Read, C. Wu, R. H. Compton; **Lieutenants/Captains:** T. W. Habermas, T. G. Henderson, M. E. Clark, D. R. Hand, L. R. Miller, D. F. Pilmer, T. R. Dyer, R. S. Hadbavny, C. S. Lee (USAF); **Lieutenants (j.g.):** R. A. Adelman, D. S. Diehl, D. L. Wehe.

### MISSION

The mission of the Engineering Department is to provide midshipmen with a course of study designed to give them an understanding of basic engineering concepts, to teach them to approach problems in an orderly and analytical manner, and to develop naval officers who will use this knowledge as a basis for sound professional judgment and decisions. It is the objective of this Department to furnish the basic engineering knowledge required of all midshipmen to complete a successful naval career, and also to provide the opportunity for interested midshipmen to pursue additional studies in the fields of Aerospace, Mechanical, and Naval Engineering. Four core courses and 43 elective courses are offered. Midshipmen are introduced to the practical applications of engineering during summer at-sea training.

### FACILITIES

Teaching facilities, other than classrooms, include 10 multi-purpose rooms which may be used for design courses or for computer-aided instruction. Ten remote terminals, providing time-sharing with computers in Washington, D.C., are in use in one of the multi-purpose rooms. Four lecture rooms have a total capacity of 472.



The Engineering Department utilizes the following seven laboratories for academic exercises and demonstrations:

**Subcritical Reactor.** This laboratory features a subcritical reactor containing 2,500 kg of natural uranium surrounded by light water and excited by a neutron source of 5 curies of plutonium-beryllium. The uranium and Pu-Be are leased from the Atomic Energy Commission. Additional laboratory equipment available includes radiation-detection devices, counters, computers, a 400-channel analyzer, and safety equipment.

**Mechanics and Materials Laboratory.** This laboratory consists of six identical laboratory cells designed and equipped to accommodate up to 20 students per cell. Tests of engineering materials which may be performed include tension, compression, torsion, beam-flexure, beam-deflection, column-buckling, hardness, and impact. Equipment is also available for heat treating metals and for metallurgical tests and other metallography work.

**Wind Tunnel.** The closed-circuit, subsonic wind tunnel is powered by a constant-speed electric motor geared to a modified, variable-pitch aircraft propeller. It is equipped with a pyramidal strut-type electric beam balance system. The maximum velocity through the  $2\frac{1}{2}' \times 3\frac{1}{2}'$  test section is 225 miles per hour. The laboratory includes a 77-seat amphitheater for observation of demonstrations and tests.

**Fluid Mechanics Laboratory.** This laboratory is equipped to demonstrate basic principles involved in fluid friction, flow-metering devices, turbomachinery, and the flow of compressible fluids. Equipment is also available to conduct exercises involving motor-driven centrifugal pumps, open-end subsonic wind tunnels and nozzles, and apparatus instrumented to determine head loss in pipes and valves as well as the characteristics of various flow meters.

**Internal Combustion Engine Laboratory.** This laboratory includes three test cells, each capable of handling 15-20 students. Each cell is equipped with associated engine equipment, including cooperative fuel research engines, small General Motors diesel engines, 4-stroke cycle commercial gasoline engines, and small and medium-sized gas turbines. There is another test cell provided with a soundproofed 75-seat amphitheater for demonstrations.

**Ship Hydromechanics Laboratory.** The laboratory's ship model towing tank is  $85' \times 6' \times 4'$ , of steel construction, and equipped with

both powered-carriage and gravity-drive mechanisms. The powered-carriage drive is capable of speeds to 10 feet per second and carries a dynamometer to measure hydrodynamic forces exerted on the towed model. All instrument systems read out to the control end of the tank, with speeds, both visually and graphically, recorded in knots to three decimals and dynamometer forces in pounds (visually) to three decimals. A wave generator is installed which produces a unidirectional wave whose height and length may be separately controlled. Waves up to 6 inches in height and 5.5 feet in length may be generated. The towing tank is equipped with special instrumentation for measuring turbulent flow in boundary layers. This equipment includes three hot-film anemometers, integrating and printing digital voltmeters, a seven-channel tape recorder, amplifiers, filters, scopes, and equipment for performing spectral-density analysis.

A stability tank 18' x 22' x 4' is installed for stability analysis of ship models to 20 feet in length with displacements up to 2,000 pounds.

A circulating water channel is available for research and instruction. This test device is used for solving complex problems involving flow around submerged and surface-piercing bodies. The water is circulated by a pump, permitting a model to remain stationary while flow conditions are being observed.

**Thermodynamics Laboratory.** This laboratory consists of five steam-driven, 60-kilowatt turbogenerator sets, complete with condensers and necessary auxiliary equipment. All components are instrumented so that heat balances, efficiencies, and complete performance curves can be developed for each piece of equipment. This laboratory also includes the following pieces of equipment: three two-stage, water-cooled air compressors for cycle studies, pressure-volume studies, and efficiency measurements; two 6.2-ton Freon air-conditioning/refrigerating units for heat-exchange-rate experiments, cycle studies, and efficiency studies; and one concentric-ring heat exchanger for the conduct of heat-transfer experiments under conditions of parallel and counterflow.

**Model Rooms.** In addition to the Department's seven laboratories, model rooms display cutaways of current ships, ships' powerplants, and shipboard equipment, as well as models of ships and powerplants of historical interest.



## CORE COURSES

E209	Engineering Statics and Dynamics	E313	Elements of Thermodynamics
E210	Mechanics of Materials	E314	Elements of Fluid Mechanics

## MINORS PROGRAM

### Aerospace Engineering

E313	Elements of Thermodynamics
E631	Introduction to Aerodynamics
E731	Aerospace Structures I
E735	Aero Performance
E736	Aerodynamics I (in lieu of E314)
E817	Flight Vehicle Propulsion
M704	Math for Engineers and Physicists
E...	Engineering Elective

### Mechanical Engineering

E306	Fluid Mechanics (in lieu of E314)
E313	Elements of Thermodynamics
E601	Kinematics
E604	Intermediate Strength of Materials
E614	Engineering Materials
E701	Physical Metallurgy
E707	Machine Design
E...	Engineering Elective

### Naval Engineering

#### *(Naval Architecture Option)*

E306	Fluid Mechanics I (in lieu of E314)
E313	Elements of Thermodynamics
E608	Engineering Design Graphics
E610	Introduction to Ship Systems
E801	Naval Architecture I—Hydrostatics
E802	Naval Architecture II—Hydrodynamics
E821	Design Analysis of Marine Propulsion Equipment
.....	One technical course approved by Counselor

### Naval Engineering

#### *(Marine Engineering Option)*

E306	Fluid Mechanics I (in lieu of E314)
E313	Elements of Thermodynamics
E610	Introduction to Ship Systems
E709	Reactor Physics I
E710	Reactor Physics II
E821	Design Analysis of Marine Propulsion Equipment
E822	Design of Marine Power Plants
.....	One technical course approved by Counselor

## MAJORS PROGRAM

### Aerospace Engineering

E305	Thermodynamics (in lieu of E313)	E815	Vibration and Flutter of Flight Vehicles
E614	Engineering Materials	E817	Flight-Vehicle Propulsion
E631	Introduction to Aerodynamics	E832	Aerospace Structures II
E731	Aerospace Structures I	E837	Gas Dynamics I
E735	Aero Performance	M704	Math for Engineers and Physicists
E736	Aerodynamics I (in lieu of E314)		

*Plus three of the following courses:*

E702	Systems Engineering	E838	Gas Dynamics II
E708	Heat Transfer I	E924	Advanced Topic in Aerospace Engineering
E831	Aerodynamics II	M721	Advanced Calculus I
E834	Orbital Mechanics	W707	Digital Computers
E835	Stability and Control		
E836	Aero Design		

### **Mechanical Engineering**

E305	Thermodynamics (in lieu of E313)	E701	Physical Metallurgy
E310	Fluid Mechanics (in lieu of E314)	E707	Machine Design
E601	Kinematics	E708	Heat Transfer
E604	Intermediate Strength of Materials	E759	Intermediate Dynamics
E614	Engineering Materials	E809	Mechanical Vibrations
		E...	Engineering Elective
		M751	Engineering Math I

*Plus two of the following courses:*

E501	Engineering Drawing and Descriptive Geometry (or E608)	E744	Mechanical Behavior of Materials
E606	Theory of Engineering Experimentation	E810	Reactor Kinetics
E608	Engineering Design Graphics (or E501)	E813	Continuum Mechanics
E702	Systems Engineering	E821	Design Analysis of Marine Propulsion Equipment
E709	Reactor Physics I	E822	Design of Marine Power Plants
E710	Reactor Physics II	E837	Gas Dynamics I
E713	Advanced Mechanics of Materials	M752	Engineering Math II

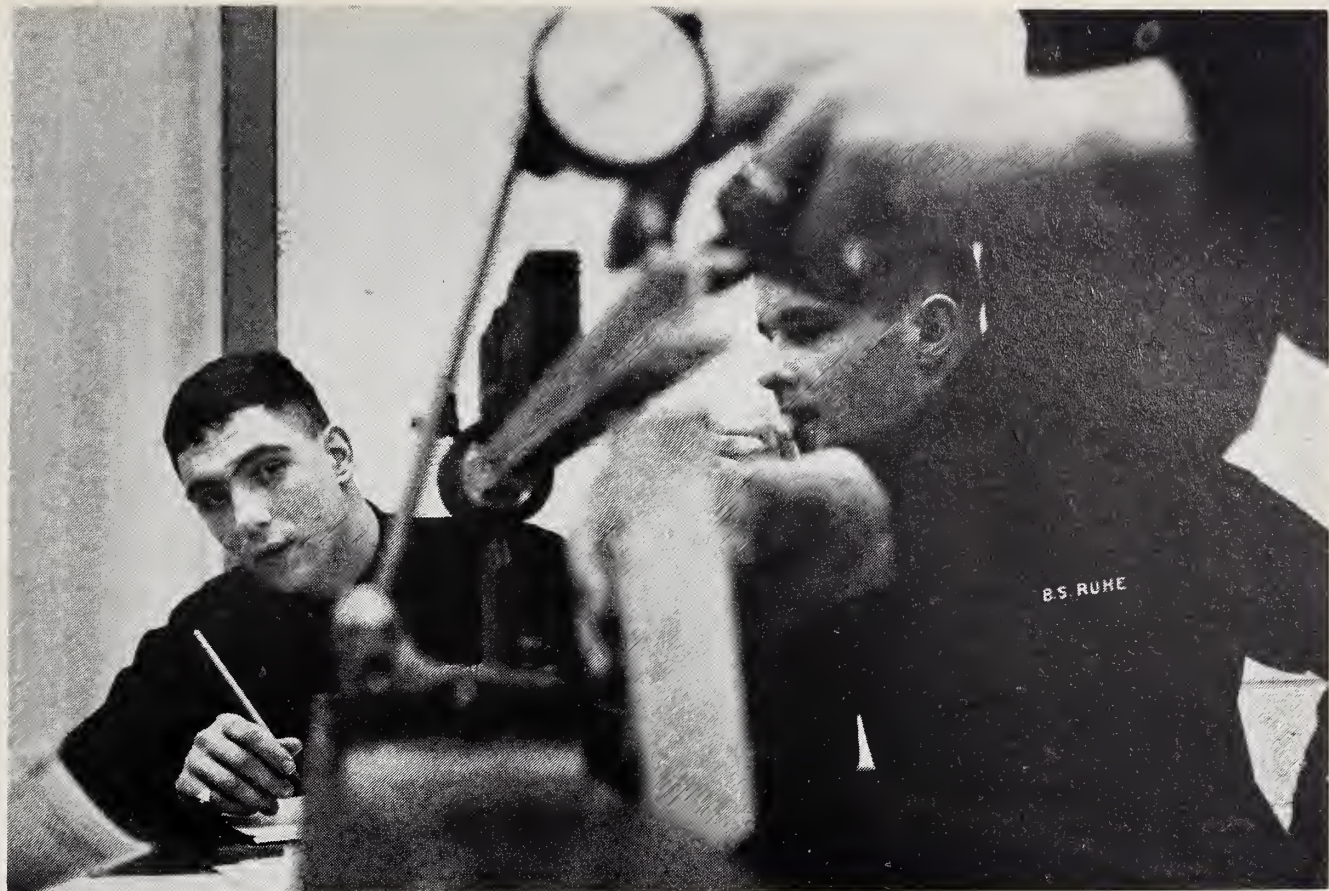
### **Naval Engineering**

E305	Thermodynamics I (in lieu of E313)	E801	Naval Architecture I—Hydrostatics
E306	Fluid Mechanics I (in lieu of E314)	E802	Naval Architecture II—Hydrodynamics
E608	Engineering Design Graphics	E811	Ship Structures
E610	Introduction to Ship Systems	E821	Design Analysis of Marine Propulsion Equipment
E709	Reactor Physics I	E822	Design of Marine Power Plants
E710	Reactor Physics II	M751	Engineering Math I

*Plus two of the following courses:*

E501	Engineering Drawing and Descriptive Geometry	E715	Ship Vibrations (or E809 Mech Vibrations)
E606	Theory of Engineering Experimentation	E810	Reactor Kinetics
E614	Engineering Materials	E813	Continuum Mechanics
E702	Systems Engineering	E902	Engineering Research Project
E708	Heat Transfer	M752	Engineering Math II
		W707	Digital Computers





Measuring deflection of a metal beam

## Course Descriptions

**E209 ENGINEERING STATICS AND DYNAMICS.** *Four Sem Hrs (4-0).* A course in applied engineering mechanics stressing Newton's laws of motion. Topical coverage includes a study of forces, moments, couples, resultants of force systems, equilibrium, kinematics, and kinetics of particles and rigid bodies. Problems are included dealing with trusses, machines, centroids, friction, relative motion, and accelerating rigid bodies. *Prereq: M120; Coreq: S211.*

**E210 MECHANICS OF MATERIALS.** *Four Sem Hrs (3-2).* A first course in strength of materials which covers the following topics: simple stress, simple strain, torsion, shear and moment in beams, stresses in beams, beam deflection, combined stresses, and columns. Laboratory work is included on the properties of materials. *Prereq: E209.*

**E305 THERMODYNAMICS I.** *Four Sem Hrs (4-0).* A first course in the principles of energy conversion, emphasizing the classical approaches to, and development from, the first and second laws of thermodynamics. The course includes properties of gases and vapors, thermodynamic processes, Clausius' inequality, consequences of the second law, and analyses of heat power and refrigeration cycles. *Prereq: M224, S212.*

**E306 FLUID MECHANICS I.** *Four Sem Hrs (4-0).* A first course in fluid mechanics which covers the following topics: fluid properties; fluid statistics; basic flow concepts; basic equations, including conservation of mass, momentum, and energy; dynamic similitude, including Reynolds, Mach, and Froude numbers; and viscous effects, including the boundary layer, fluid dynamic lift and drag, and frictionless compressible flow. *Prereq: E305 or E313.*

**E308 ADVANCED FLUID MECHANICS.** *Four Sem Hrs (4-0).* Second semester of continuum fluid mechanics sequence. Topics include dimensional analysis;

empirical, phenomenological and mathematical approaches to laminar and turbulent flow; hydrodynamic flow noise; ship and model testing; compressible flow; and a fluid mechanics design problem. *Prereq: E813.*

**E310 FLUID MECHANICS I.** *Four Sem Hrs (4-0).* A first course in fluid mechanics which covers the following topics: fluid characteristics; basic equations, including continuity equation, equations of motion, hydrostatics, Bernoulli equation, and momentum theorems; dynamic similitude; potential flow of real fluids; and boundary layer theory. *Prereq: E305.*

**E313 ELEMENTS OF THERMODYNAMICS.** *Four Sem Hrs (4-0).* A course in applied engineering thermodynamics emphasizing the first and second laws of thermodynamics and resultant principles and concepts with particular applications to steam and gas power cycles and concomitant equipment. *Prereq: E210.*

**E314 ELEMENTS OF FLUID MECHANICS.** *Four Sem Hrs (3-2).* The first half of the course treats the fundamental concepts of fluid mechanics. Continuity and the equations of motion and momentum are covered. The second half of the course consists of a case problem which applies both thermodynamics and fluid mechanics to the preliminary design analysis of a naval turbine propulsion plant. Laboratory exercises supplement the course material. *Prereq: E313.*

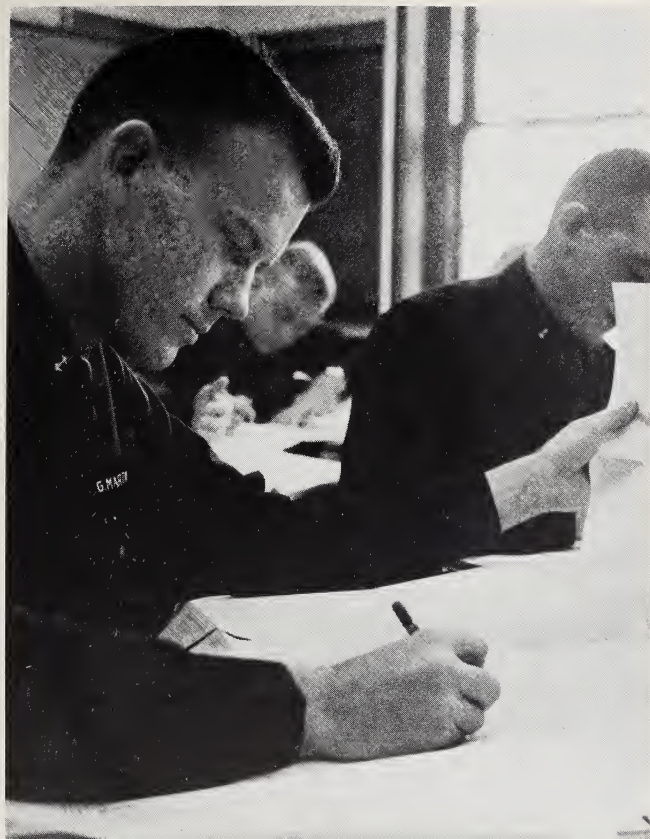
**E501 ENGINEERING DRAWING AND DESCRIPTIVE GEOMETRY.** *Three Sem Hrs (3-0).* An introduction to engineering graphical methods and disciplines, with emphasis on spatial visualization providing experience in creative thought and in procedures to convey ideas through graphical communications. Instruction includes the study of both abstract and mechanical forms and their representation in two-dimensional mediums by means of freehand and instrument drawing. Topical coverage includes points, lines, planes, and solids in space, with representation by orthographic, axonometric, and oblique projections. Engineering applications involve practice in detail and assembly drawings of mechanical components.

**E502 BASIC GRAPHICS.** *One Sem Hr (0-2).* A brief coverage of the elements of engineering graphics and descriptive geometry, with applications. Topical coverage includes use of drawing instruments, spatial reference, and visualization of points, lines, planes, and solids. The applications involve practice in drawing mechanical components.

**E601 KINEMATICS.** *Three Sem Hrs (3-0).* A study of displacements, velocities, and accelerations of machine elements. Topics include centros and Kennedy theorem; velocity and acceleration polygons, including image method, graphical differentiation, and integration; development of plate and cylindrical cam profiles for various followers; and rolling contact through friction gearing of ellipses and hyperboles, cycloidal and involute gear teeth, gear trains, rack and pinion, and flexible connectors. *Prereq: M111.*

**E604 INTERMEDIATE STRENGTH OF MATERIALS.** *Three Sem Hrs (3-0).* A second course in strength of materials which generalizes some of the concepts in the first course and introduces new ones. The course covers the fundamentals of stress, strain and the generalized Hooke's law; tension, compression, torsion and bending of bars; beam stresses, deflections and the singularity function; statically indeterminate members; three-dimensional Mohr's circles of stress and





Solving a  
problem in  
"thermo"

strain; and energy methods and theories of failure. *Prereq: E210, M224.*

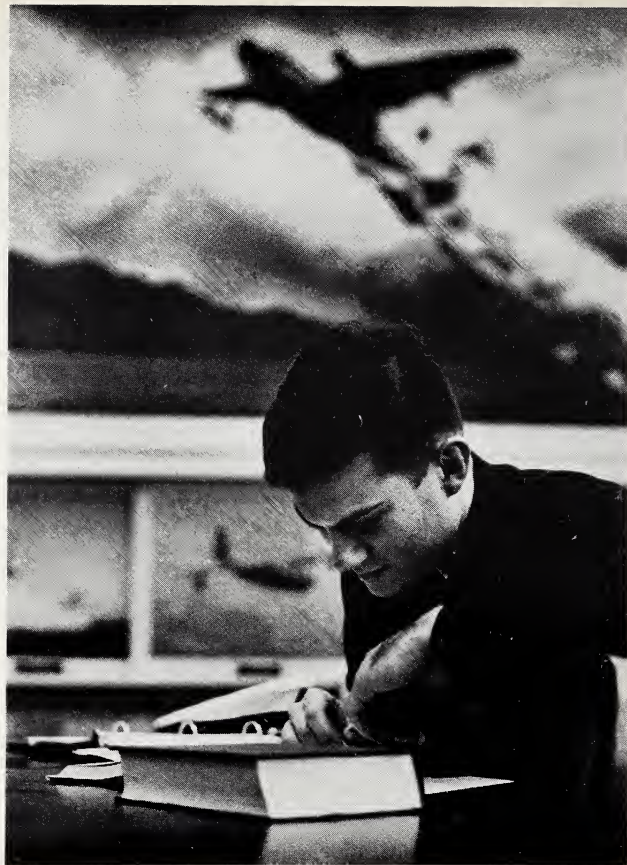
**E606 THEORY OF ENGINEERING EXPERIMENTATION.** *Three Sem Hrs (2-2).* A course relating the theoretical, analytical, and statistical aspects of experimental work stressing the basic similarities common to all types of experiments. Traditional measuring devices are used to introduce the concepts and propagation of error. The treatment of experimental data, its interpretation and logical presentation, is also stressed. *Prereq: M111.*

**E608 ENGINEERING DESIGN GRAPHICS.** *Three Sem Hrs (3-0).* A course in engineering graphical methods and disciplines with emphasis on spatial visualization. Instruction includes the study of both abstract and mechanical forms and their representation in two-dimensional mediums as a means of providing experience in creative thought and as a method of conveying ideas through graphical communication. Both freehand and instrument drawing are emphasized. Studies include the theories of orthographic, axonometric, and perspective projection. Engineering applications involve practice in detail and assembly drawings of mechanical components and the representation of fair surfaces with special emphasis on the delineation of ship's lines. *Prereq: E501 or E502, or equivalent; Coreq: E209.*

**E610 INTRODUCTION TO SHIP SYSTEMS.** *Three Sem Hrs (3-0).* An introductory course in naval architecture. The primary ship's systems and their



A study break  
between labs



relationship to preliminary design are considered. The following topics are covered: concept formulation and the design-building spiral, structural systems, shipyard practices and launching, the importance of weight control and its relation to transverse and longitudinal stability, resistance and prediction of effective horsepower, propulsion and steering, the choice and adaptation of propulsive equipment, and ship systems of the near future. *Coreq: E209.*

**E614 ENGINEERING MATERIALS.** *Three Sem Hrs (2-2).* An introductory course in the science of engineering materials covering metals, ceramics, and plastics. Included are atomic structure and bonding, molecular structures, crystal structures, solid solutions, crystal imperfections, solid state diffusion, electrical properties, magnetic properties, deformation and failure of materials, modification of properties through changes in microstructure, solid-state reactions, and multiphase materials. Laboratory work includes methods of testing and evaluating engineering properties of materials, heat treating, phase transformations, and changes in composition. *Coreq: E210.*

**E631 INTRODUCTION TO AERODYNAMICS.** *Three Sem Hrs (3-0).* Introduction to fluid mechanics as applied to the flight vehicle. Specific areas of coverage are Newton's laws, the atmosphere, introductory fluid dynamics, aeronautical nomenclature, experimental procedures, planform and viscous effects, and introductory compressibility. *Prereq: M120; Coreq: S211.*

**E701 PHYSICAL METALLURGY.** *Three Sem Hrs (3-0).* A study of the principles of physical metallurgy, including atomic structure, energy levels in free atoms, electron energies in solids, methods of studying crystal systems, imperfections in crystal structures, liquid and solid phases of metal, phase transformations, solid-solution phase diagrams, nonequilibrium solidification, solid-state reactions, elasticity, mechanisms of plastic deformation, high temperature strength, diffusion in metals, age hardening, equilibrium heat treatment, and nonequilibrium decomposition. *Prereq: E614.*

**E702 SYSTEMS ENGINEERING.** *Three Sem Hrs (3-0).* Concerned principally with the description and analysis of multi-variable engineering systems. Mathematical models in both time and frequency domains are studied with emphasis on the state-variable method because of its adaptability to solution by digital computer. Linear-continuous, linear-discrete, and stochastic systems are considered. *Prereq: M224, S212.*

**E707 MACHINE DESIGN.** *Three Sem Hrs (3-0).* Application of basic theories of mechanics of solids, kinematics, and dynamics, and the properties of engineering materials are utilized in the actual design of the most common machine elements. Topics include variable loads and stress concentrations, dynamic loading, thermal-differential expansion, springs, gearing, bearings, thin- and thick-film lubrication, strength and durability of gears, shafting, flywheels, and other selected subjects. Various design and analysis projects are assigned throughout the course. *Prereq: E601, E604.*

**E708 HEAT TRANSFER I.** *Three Sem Hrs (3-0).* Introductory study of engineering heat transfer. Topics include the theory of steady-state conduction in one, two and three dimensions; transient conduction; heat conduction with heat source; finned surfaces; radiation between black surfaces, radiation between gray surfaces; and analytical methods, numerical methods, and electrical analogies. Also included are the application of fluid dynamic principles to the study of free and forced convection; flow characteristics in ducts, over flat plates, and through tube bundles; heat exchange design; aerodynamics heating; and applications to design, incorporating conduction, radiation, and convection heat transfer. *Coreq: E306 or E736 and M704 or M751.*

**E709 REACTOR PHYSICS I.** *Three Sem Hrs (3-0).* Fundamental aspects of atomic and nuclear structures are given emphasis. Natural and induced radioactivity, laws of radioactive decay, including a demonstration of half life, binding energy and nuclear stability, compound nucleus, liquid drop model and theory of fission, cross sections, including a demonstration of total cross section, Maxwell-Boltzmann distribution of thermal neutrons, center of mass system and laboratory system mechanics, slowing down density, resonance escape probability, thermal utilization factor, and the four-factor formula for  $k$  (infinite). Brief introduction to the meaning of Fermi age and diffusion length, both the physical meaning and the mathematical derivation of these probabilities on nonfast and nonslow leakage of neutrons. Material and geometric buckling. Finally, the diffusion equation and the critical equation applied to a thermal reactor. *Prereq: M224.*

**E710 REACTOR PHYSICS II.** *Three Sem Hrs (2-2).* This is the second semester's work in reactor physics. The course includes work in the Subcritical

Reactor Laboratory where the sub-critical (U-nat., water) reactor is located. Health physics orientation, use of foils for flux mapping, statistics, diffusion length of neutrons in water, thermal utilization factor, material and geometric buckling, and, finally, finding  $K(\text{inf.})$  and  $K(\text{eff.})$  for Academy's reactor. The lab work also includes gamma spectrum analysis via a 400-channel gamma analyzer, some simulation of delayed neutron step functions, xenon poisoning build-up after shutdown, and parent-daughter decay problems via the 20 amplifier analog computer. Class work and laboratory work are closely correlated. Study is made of the interactions of radiations with matter; elementary shielding considerations and the mathematical physics approach are emphasized at all times. Course concludes with a comprehensive review problem in which the various topics are functionally related to each other. *Prereq: E709.*

**E713 ADVANCED MECHANICS OF MATERIALS.** *Three Sem Hrs (3-0).* A course in the area of mechanics of materials and the theory of elasticity which deals with topics not normally covered in the elementary courses of strength of materials and which, in addition, includes more rigorous formulation of stress and strain at a point. Covers the concepts of stress vector, stress tensor, strain tensor and the stress-strain relationships. The equations of elasticity are derived and the use of differential equations and the Airy stress function of solving simple problems in elasticity are included. Also covered are concept of strain energy and the use of energy methods including principles of virtual work, Castigliano's theorem, and the principle of minimum strain energy. Other topical coverage includes beams on elastic foundation, buckling of columns and the Rayleigh-Ritz method, thick-walled cylinders, rotating discs, curved beams, stress concentration, torsion of non-circular cross sections, and the membrane analogy. *Prereq: E604, M571.*

**E715 SHIP VIBRATIONS.** *Three Sem Hrs (3-0).* A fundamental course in the theory of vibrating systems. Application to problems encountered in ship systems are stressed. Primary emphasis is placed upon steady and transient vibrations of undamped and damped single degree of freedom systems, both free and forced. The analogies, and multimass systems are also emphasized. Distributed systems, non-linear systems, and shock are discussed. *Prereq: M704 or M751.*

**E731 AEROSPACE STRUCTURES I.** *Three Sem Hrs (3-0).* An application of the principles of solid mechanics to the lightweight structures of flight vehicles. Topics include analyses of trusses, beams, frames, and thin-walled sections. Methods studied are virtual work, Castigliano's theorem, conjugate beam, area-moment, and slope deflection. Loads on aircraft and spacecraft are also studied and computer-oriented solutions are stressed. *Prereq: E210.*

**E735 AERO PERFORMANCE.** *Four Sem Hrs (3-2).* The basic principles of aerodynamics are extended to include a detailed analysis of aircraft drag. The several types of flight vehicle powerplants are described and their performance characteristics are introduced. Drag analysis and powerplant characteristics are combined to determine vehicle performance, including the performance envelope, generalized performance methods, range and endurance, take-off and landing, and maneuvering flight. The performance of a specific aircraft is determined as a course project. Static stability and control is introduced. Laboratory wind tunnel experiments are included to support and supplement



the theoretical analysis of performance, stability and control. *Prereq: E631.*

**E736 AERODYNAMICS I.** *Four Sem Hrs (4-0).* A study in perfect fluid theory. The basic principles of aerodynamics are introduced and applied to specific problems. Topics covered include the fluid medium, kinematics of a fluid field, dynamics of a fluid field, the flow about a body, thin airfoil theory, finite wing theory, and an introduction to the dynamics of a viscous fluid. Laboratory work is included. *Prereq: E631; Coreq: M704 or M751.*

**E744 MECHANICAL BEHAVIOR OF MATERIALS.** *Three Sem Hrs (3-0).* A treatment of the mechanical properties and behavior of materials. Elastic, plastic, viscous, and viscoelastic behavior will be treated with the emphasis placed on gaining an insight into the reasons for the different types of behavior rather than mathematical rigor. Modes of failure including brittle fracture, ductile fracture, rupture, stress corrosion cracking, creep, and fatigue will also be considered in the laboratory. *Prereq: E614 and E604 or E731.*

**E759 INTERMEDIATE DYNAMICS.** *Three Sem Hrs (3-0).* A study in classical mechanics. Beginning with the basic kinematic and dynamic principles for a single particle, the equations of motion and their integrals of work-energy and impulse-momentum are studied. The equations of motion for a general system of particles are developed and applied to changing-mass problems which involve both linear and angular momentum, impulse and momentum for a system of particles, and energy principles for the particle system. Rigid-body kinematics are studied and the fundamental dynamic principles are applied to problems of rigid-body motion. In the latter part of the course generalized coordinates and Lagrangian methods are introduced. *Prereq: E209.*

**E801 NAVAL ARCHITECTURE—STATICS.** *Three Sem Hrs (3-0).* Covers the concepts and calculations involved in the hydrostatic analysis of ships. Included are numerical integration as applied to areas, volumes, and first and second moments of area. Transverse and longitudinal stability are studied at small angles of heel and trim for both surface ships and submersibles, and techniques are given to extend the study of stability into large angles of heel and trim. Stability of ships in damaged condition is studied. Each student prepares a set of hydrostatic curves of form and Bonjean curves for a given vessel. The application of digital computers to naval architectural calculations is discussed and encouraged. *Prereq: E306, E608, E610.*

**E802 NAVAL ARCHITECTURE—DYNAMICS.** *Four Sem Hrs (3-2).* Covers the concepts and computations involved in the hydrodynamic analysis of ships. The basic topics covered include laws of dimensional similitude, ship resistance, basic momentum theory of propulsive devices, screw propeller design, steering and maneuvering of ships, submarine dynamics, seakeeping of ships, characteristics of special craft such as planing hulls, hydrofoil vessels, and hovercraft, and the preliminary design of a ship. Laboratory exercises in the tow tank and other facilities supplement recitations. *Prereq: E801.*

**E805 HEAT TRANSFER II.** *Three Sem Hrs (3-0).* Concerned with the formulation and solution of the linear and non-linear differential equations which arise in heat transfer problems. The general conduction equation is analyzed for both steady and transient heat conduction using various coordinate

systems. Similarity analysis is applied to the momentum, energy, and species equations appearing in convective heat and mass transfer. Solutions are obtained by analytical and numerical methods. *Prereq: E708, M751; Coreq: M752.*

**E809 MECHANICAL VIBRATIONS.** *Three Sem Hrs (3-0).* A study of the fundamentals of vibration based on dynamic principles, with particular emphasis on modern techniques of analysis. A variety of analytical methods of solution are presented along with demonstrations of corresponding experimental techniques. Conceptual clarity is stressed throughout the study. Topics include free, damped, and forced harmonic vibration of linear-single and multi-degree-of-freedom systems, transient and nonperiodic vibrations, continuous systems, and random vibration analysis. *Prereq: E759.*

**E810 REACTOR KINETICS.** *Three Sem Hrs (3-0).* This is the third semester's work in reactor physics. The course starts out with a quick review of such topics as delayed neutrons, negative temperature coefficient, xenon poison build-up, and a step function change in reactivity. Ramp function changes in reactivity are then introduced. This is not a systems-control course but rather the physics of feedback control in reactor kinetics. Digital computers available at the Academy are utilized, including the remote-control system from GE. Basic as well as FORTRAN language is used. Longhand computation starts the work so that the computer's advantage is readily appreciated. Assigned work includes programming and wiring circuits for the analog computer (TR-20). Analyses of the primary and secondary loops of the PWR-type of reactor are emphasized. The course terminates with the equations for the solution of a two-group, two-region reactor core and reflector and plotting of the flux on graph paper. *Prereq: E710.*

**E811 SHIP STRUCTURES.** *Three Sem Hrs (3-0).* A course in structural theory and practice, including longitudinal and transverse strength of the hull girder, bending moments in a seaway, development of the ship's structural design, submarine pressure-hull design, and shipbuilding materials. Case problems in structural design are studied. *Prereq: E210, E610.*

**E813 CONTINUUM FLUID MECHANICS.** *Three Sem Hrs (3-0).* An introduction to the mechanics of linear and nonlinear fluids. Emphasis on constructing mathematical models of real materials. Topics include matrices, Cartesian tensors, Jacobians, fluid kinematics, Reynolds transport theorem, stress, conservation of mass and energy, Cauchy and Euler equations of motion, accelerating reference frames, invariance requirements, constitutive equations for Newtonian and non-Newtonian fluids, material objectivity, rheological behavior, Navier-Stokes equations, applications to laminar and turbulent flow, and turbulent flow noise. *Prereq: E306 or E736; M224 or equivalent.*

**E815 VIBRATION AND FLUTTER OF FLIGHT VEHICLES.** *Three Sem Hrs (3-0).* Fundamentals of vibrating systems with applications to aircraft and spacecraft components. Introduction to aeroelasticity, wing divergence, control effectiveness and reversal, and wing flutter. *Prereq: E832, E736.*

**E817 FLIGHT-VEHICLE PROPULSION.** *Three Sem Hrs (3-0).* The principles of fluid dynamics and thermodynamics are specialized to the problems of propulsion of aircraft and space vehicles. The various kinds of flight vehicle propulsion devices are described and their performance characteristics in the





*Research in the Hydromechanics Lab*

operating environment are examined in some detail with a view towards establishing optimization parameters. The analysis and design of engine components is briefly considered. *Prereq: E306 or E310 or E736.*

**E821 DESIGN OF MARINE POWER PLANTS.** *Four Sem Hrs (3-2).* A preliminary design study of the machinery essential to a marine power plant. Through the use of a case problem, the student integrates the machinery component design problems into a complete marine power plant heat balance. The heat balance leads to an understanding of overall plant efficiency, steam rates, and performance. The laboratory is utilized to verify design assumptions and





**Subcritical nuclear reactor**

derive performance criteria for power plant equipment. This course gives the student an understanding of the overall design problem of a ship's machinery plant and its thermo-fluid system relationships. *Prereq: E306 or E314, E610.*

**E822 DESIGN ANALYSIS OF MARINE PROPULSION EQUIPMENT.** *Four Sem Hrs (3-2).* This course covers the principles of design for boilers, turbines, condensers, and gas turbines. The student develops a detailed design of these components based upon the preliminary design requirements established in E-821. *Prereq: E821.*

**E831 AERODYNAMICS II.** *Three Sem Hrs (3-0).* An advanced course in aerodynamics covering the Navier-Stokes equations and the boundary layer approximation. Incompressible and compressible laminar boundary layers. Transition; turbulent boundary layers. Convective heat transfer in laminar and turbulent flow. An introduction to supersonic wind theory and hypersonic and high-temperature flows. *Prereq: E736, E837.*

**E832 AEROSPACE STRUCTURES II.** *Three Sem Hrs (3-0).* Analysis of rings and frames by elastic center method. Thin-walled elements with emphasis on shear stresses. Membrane stresses in pressure vessels. Bending of thin, flat plates. Skin-stringer structural systems. Tension field beam. Flight-vehicle materials and their properties. *Prereq: E731; Coreq: M704 or M751.*

**E834 ORBITAL MECHANICS.** *Three Sem Hrs (3-0).* An introductory treatment of the elements of space flight. The orbits of planets and satellites, including the suborbital and escape cases, are approached from consideration of classical mechanics. Orbital control, effects of earth oblateness and the optimization of rocket-propelled vehicle trajectories are considered. *Prereq: M224, E209.*

**E835 STABILITY AND CONTROL.** *Three Sem Hrs (3-0).* A subdivision of the subject of flight dynamics. The aerodynamic and inertial forces and moments acting on the flight vehicle and its parts are analyzed to determine

their effect on dynamic stability. The dynamic response of the airplane to actuation of controls is considered. The flying qualities of the aircraft thus determined are then examined, and the use of stability augmentation systems as a means of improving aircraft flying qualities are studied. Finally, flight simulation devices and methods as an analytic tool are discussed. *Prereq: E735.*

**E836 AEROSPACE DESIGN.** *Three Sem Hrs (1-4).* Preliminary design of a flight vehicle. Includes preliminary layout, weight and balance estimates, performance analysis, stability analysis, and structural analysis. Detailed consideration is given to one aspect of the design, e.g., performance, stability, or structure. *Prereq: E731, E735.*

**E837 GAS DYNAMICS I.** *Three Sem Hrs (3-0).* Intended to give a comprehensive view of the methods of gas dynamics in internal-flow systems. Topics covered include thermodynamics of perfect and real gases, fundamental theorems of one-dimensional, compressible subsonic and supersonic flows, methods of flow measurement and flow visualization, nozzle and diffuser theory, normal and oblique shock waves, flow in ducts and wind tunnels, and Prandtl-Meyer flow and characteristics theory in nozzle design. *Prereq: E306 or E736, M704 or M751.*

**E838 GAS DYNAMICS II.** *Three Sem Hrs (3-0).* Further development of one-dimensional steady and non-steady compressible flow with major emphasis placed on non-steady flow analysis. Topics include generalized methods in gas dynamics, influence coefficients, flow with viscous and thermal effects, detonation and deflagration theory, characteristics and waves in non-steady flows, shock tube theory, pressure exchange and combustion in non-steady flows, dynamic flow machines, and steady and non-steady thrust generators. *Prereq: E837.*

**E902-903 ENGINEERING RESEARCH, DESIGN, OR CONSTRUCTION PROJECT.** *Three Sem Hrs Each Term (0-6, 0-6).* A creative engineering research, design, or construction project in the student's field of interest, entailing a minimum of six hours of laboratory, shop, or design work each week. A project of sufficient scope may be continued for a second semester. *Prereq: Approval by Head of Department.*

**E904-905 ENGINEERING RESEARCH, DESIGN, OR CONSTRUCTION PROJECT.** *Two Sem Hrs Each Term (0-4, 0-4).* Same as E902-903 except that a minimum of four hours of laboratory, shop, or design work is required each week.

**E906-907 ENGINEERING RESEARCH, DESIGN, OR CONSTRUCTION PROJECT.** *One Sem Hr Each Term (0-2, 0-2).* Same as E902-903 except that a minimum of two hours of laboratory, shop, or design work is required each week.

**E924 ADVANCED TOPIC IN AEROSPACE ENGINEERING.** *Three Sem Hrs (3-0).* Selected topic of theoretical nature in aerospace engineering which is not covered by regular courses of the curriculum and which is designed to emphasize the application of advanced mathematical methods. Topic can be changed from year to year. Possible topics include aerodynamics of V/STOL vehicles, rarefied gas flows, magnetoaerodynamics, high temperature flight structures, space flight dynamics, and ion/electric propulsion. *Prereq: Approval of instructor and Chairman of Aerospace Engineering.*

## ENGLISH, HISTORY, AND GOVERNMENT DEPARTMENT

**Head of Department:** Captain H. A. Cummings; **Executive Officer:** Commander R. H. Wilson; **Senior Professor:** W. W. Jeffries; **Professors:** E. B. Potter, A. S. Pitt, D. R. Lacey, J. R. Fredland, E. J. Mahoney, N. T. Kirk, J. C. Reed, W. L. Heflin, E. M. Hall, R. W. Daly, R. L. Mason, J. R. Probert, P. E. Coletta, W. B. Lewis, H. H. Adams, T. P. Carpenter, R. M. Paone, W. H. Russell, W. M. Belote; **Foreign Service Officer:** D. Gleysteen; **Associate Professors:** E. H. Clark, Jr., J. T. Pole, H. H. Beli, Jr., C. L. Crane, Jr., H. A. Wycherley, J. P. Boatman, T. Boyajy, W. M. Darden, R. A. Bender, J. A. Arnold, R. A. Williams, A. A. Richmond, III, J. N. Wysong, J. W. Houston, R. Megargee, W. L. Calderhead, A. M. Rose, M. Jasperson, A. R. Whitaker; **Lieutenant Commanders/Majors:** T. E. Powers, R. E. Johe, D. A. Davis, R. M. Kostosky (USMC), C. Albans (USMC); **Assistant Professors:** H. C. Durham, Jr., J. P. Thomas, J. H. Dukes, A. C. Ballas, L. C. Wilson, C. G. Reynolds, P. W. Warken, G. P. Atkins, C. L. Cochran, J. A. Fitzgerald, Jr., K. J. Kerin, R. E. Knight, P. R. Marshall, C. E. Morris, Jr., R. Broude, J. F. Collins, E. B. Duffee, Jr., J. T. French, P. A. Mangano; **Lieutenants:** H. L. Harder, W. S. Norman, P. D. Flynn, Jr., D. R. Adams, R. G. Farina, J. A. Camp, T. G. Rhoad, J. W. Bliley, A. R. Posner, D. T. Siebert, G. W. Reiger; **Lieutenants (j-g.):** E. P. Sullivan, J. C. Golembe, J. B. Wharton, D. C. Fuller, Jr.; **Ensign:** E. W. Gosnell, Jr.; **Visiting Lecturer:** R. A. Mikaliunas.

### MISSION

The mission of the English, History, and Government Department is to educate the midshipman as a discriminating individual with an understanding of history, government, economics, and literature, and to develop in him a mature ability to read with comprehension and appreciation, to write with clarity and style, and to speak with conviction and poise. In support of this mission, the Department offers some 60 electives in addition to the 24 semester hours of core courses required of every midshipman.

### FACILITIES

The English, History, and Government Department occupies Maury Hall adjacent to the Naval Academy Library. In addition to the usual recitation rooms, there are rooms with motion-picture, slide, microfilm, and tape-recording equipment to give midshipmen an opportunity to view events of historical and educational note and hear readings of great literature. There are also nearby auditoriums available for presentations to large groups.



## CORE COURSES

H101	Composition and Literature, <i>or</i>	H303	United States Government and
H103	Composition and Literature, Advanced Course		Constitutional Development
H102	Composition and Literature, <i>or</i>	H304	Economic Analysis
H104	Composition and Literature, Advanced Course	H403	History of Seapower
		H404	Readings in Western Ideas
H201	European Civilization and World Power Since the French Revolution	H406	The United States in World Affairs

## MINORS PROGRAM

### Foreign Affairs

H639	International Relations and Or- ganizations
H642	U.S. Diplomatic History
H737	Modern Middle Eastern Prob- lems, <i>or</i>
H739	Far Eastern Relations of the United States, <i>or</i>
H735	Modern Far Eastern Problems, <i>or</i>
H831	Europe in the 20th Century
H746	Foreign Political Institutions, <i>or</i>
H732	Soviet History and Contempo- rary Problems, <i>or</i>
H738	Latin American History and Contemporary Problems
H938	Research Seminar in Area Studies
....	Any Foreign Affairs elective of- fered by this or Modern Languages Department, se- ries 700 or above

### Literature <sup>1</sup>

H721	The Western Literary Heri- tage I
H722	The Western Literary Heri- tage II
H821	The Western Literary Heri- tage III
H822	The Western Literary Heri- tage IV
H921	Seminar in Representative Con- temporary Novelists, <i>or</i> any Modern Languages literature course, series 700 or above
H922	Seminar in Representative Play- wrights, <i>or</i> any Modern Lan- guages literature course, series 700 or above
H924	Seminar in Critical Evaluation of Literature, in lieu of H404

### History

H611	West. Civilization to 1500, <i>or</i>
------	---------------------------------------

### Politics and Economics <sup>2</sup>

H751	Economic Statistics
------	---------------------

<sup>1</sup> A midshipman minoring in Literature may, at his option, take the Literature major sequence of courses as his minor program, or, with the consent of his counselor, a combination of the two programs.

<sup>2</sup> In selecting the six elective courses required for a *minor* or the twelve courses required for a *major* in Politics and Economics, midshipmen will normally take a preponderance of courses in one field or the other. Concentrators in Economics are urged to take either H751, M770, or H752. Majors concentrating in Economics must take at least one of these courses. All Politics and Economics minors and majors are required to take H942.



H631	U.S. History to 1865, <i>or</i>	H743	Political Theory
H641	Introduction to Contemporary Non-Western Civilizations	H843	Constitutional Law
H612	History of Europe, 1500–1815, <i>or</i>	H848	Money and Banking
H632	U.S. History Since 1865	H846	Economics of Labor Relations
H735	Modern Far Eastern Problems, <i>or</i>	H746	Foreign Political Institutions
H737	Modern Middle Eastern Prob- lems, <i>or</i>	H744	Communism: Theory and Prac- tice
H731	History of Russia to 1917	H750	Political Parties and Group Politics
H732	Soviet History and Contempo- rary Problems, <i>or</i>	H942	Research Seminar in Politics and Economics
H738	Latin American History and Contemporary Problems	.....	Any Politics and Economics elective
H831	Europe in the 20th Century, <i>or</i>		
H944	Seminar in History		
....	Any History elective, 700 series or above		

### MAJORS PROGRAM <sup>1</sup>

#### Foreign Affairs

H743	Political Theory, <i>or</i>
H641	Introduction to Contemporary Non-Western Civilizations
H638	Economic Geography
H831	Europe in the 20th Century, <i>or</i>
H745	Comparative Economic Systems, <i>or</i>
H739	Far Eastern Relations of the United States
H748	International Law, <i>or</i>
H744	Communism: Theory and Prac- tice
H837	International Trade and Fi- nance
....	Any Foreign Affairs elective of- fered by this or Modern Lan- guages Department, 700 series or above

#### Literature

H621	Twentieth Century American Literature, <i>or</i>
H625	Introduction to Philosophy and Logic
H622	Twentieth Century British Literature
H623	Major British Writers, 14th– 18th Centuries
H624	Major British Writers, 19th Century
H723	Shakespeare and His Contem- poraries
H724	Classic American Writers

<sup>1</sup> Courses listed under major are additional to those required under the corresponding minor.



History	Politics and Economics <sup>2</sup>
H611 Western Civilization to 1500, <i>or</i>	H635 U.S. Economic History
H631 U.S. History to 1865, <i>or</i>	H745 Comparative Economic Systems
H641 Introduction to Contemporary Non-Western Civilizations	H638 Economic Geography
H612 History of Europe, 1500-1815, <i>or</i>	H841 Advanced Economics and Prob- lems of Defense Planning
H632 U.S. History Since 1865	H753 Price Determination and Deci- sion-Making
H831 Europe in the 20th Century, <i>or</i>	H743 Political Theory
H635 United States Economic History	M770 Introduction to Mathematical Economics
H834 Modern European Revolutions, <i>or</i>	H752 Econometrics
H835 American Colonial History, <i>or</i>	H748 International Law
H642 United States Diplomatic His- tory	H837 International Trade and Fi- nance
H936 Seminar in the Philosophy of History	H849 National Security Policy.
.... Any History elective, 700 series <i>or above</i>	

<sup>2</sup> In selecting the six elective courses required for a *minor* or the twelve courses required for a *major* in Politics and Economics, midshipmen will normally take a preponderance of courses in one field or the other. Concentrators in Economics are urged to take either H751, M770, or H752. Majors concentrating in Economics must take at least one of these courses. All Politics and Economics minors and majors are required to take H942.

### Course Descriptions

H101 COMPOSITION AND LITERATURE. *Three Sem Hrs (3-0)*. Primary emphasis is on developing efficiency in reading and in oral and written communications. Reading and discussion of selections from major American writers, with frequent quizzes. Weekly themes based on the readings and exemplifying basic forms of exposition; definition, classification, analysis, argument, criticism, comparison and contrast, etc. Individual conferences on composition in class. Practice in the use of dictionary, social and naval correspondence, and public speaking. Library visits, with an introduction to research techniques.

H101a COMPOSITION AND LITERATURE. *Three Sem Hrs (3-0)*. The general objectives and procedures are the same as for H101, except that the emphasis in reading is on modern literary types (short story, novella, novel, essay, drama, poetry) instead of a survey of American literature. For selected midshipmen.

H102 COMPOSITION AND LITERATURE. *Three Sem Hrs (3-0)*. A continuation and development of H101. Primary emphasis is on developing efficiency in reading and in oral and written communication. Reading and discussion of selections from British writers. Extensive practice in writing

themes based on the readings and exemplifying basic forms of exposition. Individual conferences on composition in class. Library visits, with an introduction to research techniques.

**H102a COMPOSITION AND LITERATURE.** *Three Sem Hrs (3-0).* A continuation and development of H101a.

**H103 COMPOSITION AND LITERATURE ADVANCED COURSE.** *Three Sem Hrs (3-0).* Designed for midshipmen with exceptional aptitude for composition and literature (approximately 10 percent). The general objectives are the same as those of H101, except that there is more emphasis on critical writing, and selected American authors are studied more intensively.

**H104 COMPOSITION AND LITERATURE, ADVANCED COURSE.** *Three Sem Hrs (3-0).* Designed for midshipmen with exceptional aptitude for composition and literature (approximately 10 percent). The major types of English literature are studied in complete works by outstanding men of letters. The general objectives are the same as those for H102, except that there is more emphasis on critical writing.

**H201 EUROPEAN CIVILIZATION AND WORLD POWER SINCE THE FRENCH REVOLUTION.** *Three Sem Hrs (3-0).* A study of European civilization during the period when the major European states experienced revolutionary transformation and exercised world-wide power. The growth of nationalism, the elements of national strength, the operation of the international balance of power, the impact of industrialization upon society and government, and the new scientific, intellectual, and cultural developments are studied. Special attention is given to the imperialistic expansion of European states throughout the world, to the origins and consequences of the two World Wars, to the Russian Revolution and Soviet development, and to the colonial revolutions in underdeveloped countries since World War II. A variety of readings is used, and a course paper on a specific problem is required.

**H300 SPEECH.** *One Sem Hr (1-0).* This course emphasizes speech composition and platform performance with the general objective of improving the midshipmen's general proficiency in oral expression. Attention is paid to *ex tempore* speaking, conference procedures, and presentations and briefings.

**H303 UNITED STATES GOVERNMENT AND CONSTITUTIONAL DEVELOPMENT.** *Three Sem Hrs (3-0).* Course objectives are (1) to implant in the midshipmen an understanding of the basic concepts of American democracy, (2) to establish an understanding of the Constitution and a knowledge of constitutional development, (3) to familiarize the student with the structure and functions of his government and the forces and factors which influence its operation, (4) to acquaint him with the nature and effects of administrative law, and (5) to compare his government with other types of government.

**H304 ECONOMIC ANALYSIS.** *Three Sem Hrs (3-0).* The elements of economics: national income, the theory of income determination, money, deposit-creation, public finance, business organization, prices and production, income-distribution, international trade, and economic growth.



**H403 HISTORY OF SEAPOWER.** *Three Sem Hrs (3-0).* The objective of this course is to provide the midshipmen with information basic to their profession, such as (1) the development of naval ships and weapons, (2) the evolution of naval tactics and amphibious doctrine, (3) the reasoning behind historic strategic decisions, (4) the influence of seapower upon history, and (5) the qualities of character and professional competence which have made great naval leaders. The nature and significance of seapower are studied in terms of their historical development successively in the Mediterranean, Atlantic, and Pacific regions. The major portion of the course is devoted to the evolution after 1900 of the surface, air, and undersea components, but the influence of changing technology on tactics and the relation of both to naval strategy provide the basic frame of analysis throughout the course. U.S. Naval leadership and operations are emphasized, and the course is concluded with a consideration of the problems of integrated American defense.

**H404 READINGS IN WESTERN IDEAS.** *Three Sem Hrs (3-0).* The objective of this course is to develop the midshipmen's intellectual maturity (1) by exploring some of the problems of human existence, (2) by deepening their understanding of human personality, (3) by sharpening their perceptions of literary values through writings and discussion, and (4) by perfecting their ability to communicate their own ideas and to evaluate those of others. There is no single standard textbook. Course work involves the reading and the discussing of at least five masterpieces selected from world literature, past and present. The readings and the discussions in any one class-section are related to a single thematic objective. The instructor makes his own title selections for the class section; he then directs the classroom discussion toward the objective adopted. Examinations and formal essays emphasize advanced composition.

**H406 THE UNITED STATES IN WORLD AFFAIRS.** *Three Sem Hrs (3-0).* Covers the major problems and policies of the United States in its contemporary world relations. It includes the historical development of American foreign policies and their current projection in international power politics. American foreign policy is studied in terms of (1) its geographic, economic, political, and



cultural determinants, (2) the decision-making process by which it is shaped, (3) its reciprocal relationship with national security policy in an age of nuclear technology, and (4) its implementation in the context of the interests and actions of the other world powers and of the geopolitical forces which underlie them.

**H611 WESTERN CIVILIZATION TO 1500.** *Three Sem Hrs (3-0).* A survey of the history of Western civilization during the ancient and medieval periods. Attention is given to political, economic, and social developments and to the cultural contributions of each people and period.

**H612 HISTORY OF EUROPE, 1500-1815.** *Three Sem Hrs (3-0).* A survey course in which the following major developments will be studied: the rise of Spain, England, and France as national states, the development of absolute monarchy, the era of oceanic exploration and of overseas colonization, the rise of capitalism, the Protestant Revolt or Reformation, the Scientific Revolution, the development of constitutional government, the rise of Russia and Prussia, and the French Revolution and Napoleon. Readings presenting differing points of view will be used as a basis of discussion.

**H621 TWENTIETH CENTURY AMERICAN LITERATURE.** *Three Sem Hrs (3-0).* Readings in drama, poetry, the essay, and the novel from 1900 to the present, with emphasis on such writers as Dreiser, Lewis, Hemingway, O'Neill, and Faulkner. *Prereq: H101, H102.*

**H622 TWENTIETH CENTURY BRITISH LITERATURE.** *Three Sem Hrs (3-0).* Readings from the major British writers of fiction and poetry since 1900. Especial attention to representative novels of Conrad, Lawrence, Joyce, Huxley, Waugh, Green, and Caryl. *Prereq: H101, H102.*

**H623 MAJOR BRITISH WRITERS, 14th-18th CENTURIES.** *Three Sem Hrs (3-0).* Intensive study of selected works of principal figures in the literature of England such as Chaucer, Malory, Spenser, Donne, Milton, Pope, and Fielding; their thought and art, their historical background, their significance as representatives of their times, and their contributions to the culture of the English-speaking nations. *Prereq: H101, H102.*

**H624 MAJOR BRITISH WRITERS, 19th CENTURY.** *Three Sem Hrs (3-0).* Intensive study of selected works of principal figures in the literature of England in the 19th century such as Wordsworth, Keats, Scott, Dickens, Tennyson, Browning, Arnold, and Hardy; their thought and art, their historical background, their significance as representatives of their times, and their contributions to the culture of the English-speaking nations. *Prereq: H101, H102.*

**H625 INTRODUCTION TO PHILOSOPHY AND LOGIC.** *Three Sem Hrs (3-0).* A survey of Western secular philosophy based on readings in representative philosophers. The main objective is to acquaint the student with the basic problems of philosophical inquiry and a variety of solutions to them. The principles of logic are introduced at appropriate points.

**H631 UNITED STATES HISTORY TO 1865.** *Three Sem Hrs (3-0).* An historical study of the development of American civilization from 1763 through the Civil War. Attention is paid to the historical foundations of the Nation and its culture including the American Revolution, the growth of nationalism, the

westward movement, and the sectional crisis. Emphasis is placed upon the development of the major institutions of the United States having their origins within this period.

**H632 UNITED STATES HISTORY SINCE 1865.** *Three Sem Hrs (3-0).* A continuation of the study of American civilization from the Reconstruction Period to the present, emphasizing the course of industrialization, the settlement of the West, and the emergence of the United States as a world power. Attention is paid to the development of our present society through the impact of the two World Wars and the depression of the 20th century.

**H635 UNITED STATES ECONOMIC HISTORY.** *Three Sem Hrs (3-0).* A study of the American economy from Colonial times to the present, with special emphasis on the interrelations between the ways Americans have made a living and their social and political attitudes, America's role in the world economy, the rise of the large corporation, and the development of the labor movement.

**H638 ECONOMIC GEOGRAPHY.** *Three Sem Hrs (3-0).* The study of earth science insofar as it affects man's patterns of production, distribution, and consumption: population, climatology, soil characteristics, and distribution of mineral resources.

**H639 INTERNATIONAL RELATIONS AND ORGANIZATION.** *Three Sem Hrs (3-0).* Deals with the principles, theories, machineries, and major problems of international relations. It stresses the development of international organizations, particularly the United Nations and regional organizations, and their roles in international affairs. Extensive opportunity is provided for the study of policy and the application of diplomatic strategy to major international problems.

**H641 INTRODUCTION TO CONTEMPORARY NON-WESTERN CIVILIZATIONS.** *Three Sem Hrs (3-0).* Designed to provide the midshipman with a basic knowledge of the civilizations of Asia and Africa. Emphasis is placed upon the understanding of cultural patterns and ways of life and thought in the areas concerned. Subject matter includes treatment of religion and philosophy, social structure, economic conditions, political forms and attitudes, and the role of the area in world affairs.

**H642 UNITED STATES DIPLOMATIC HISTORY.** *Three Sem Hrs (3-0).* This course is designed to give a thorough knowledge of the historical development of the basic United States foreign policies from the American Revolution to the present. It stresses the fundamental principles and forces which have shaped these policies and the evolving role of the United States.

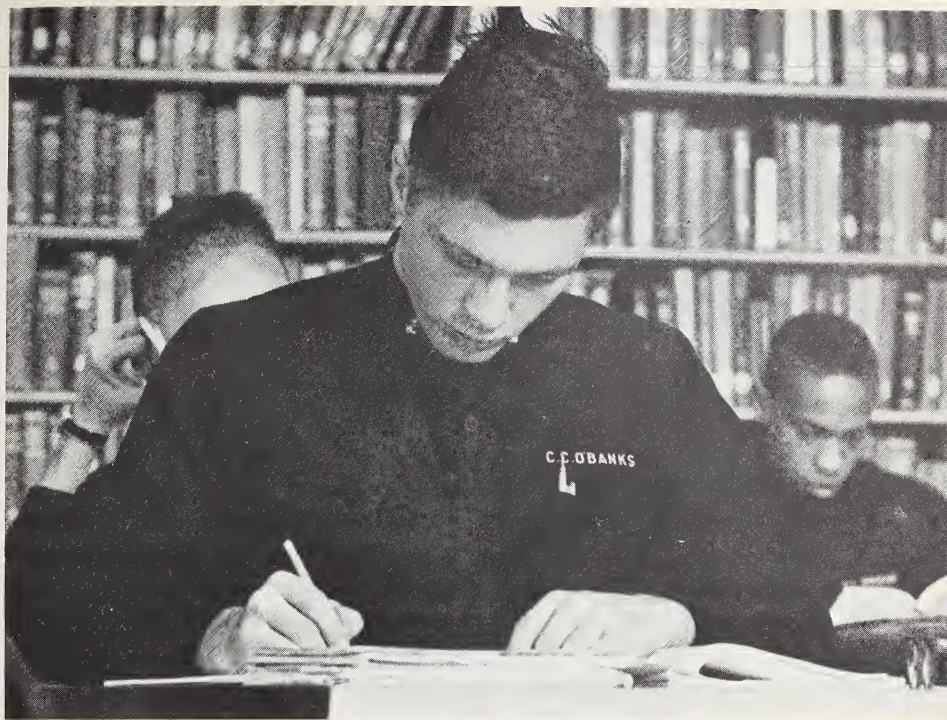
**H721, H722, H821, H822 THE WESTERN LITERARY HERITAGE, I, II, III, IV.** The basis of the Literature minor is a four-semester sequence called The Western Literary Heritage, which comprises a study of the most significant and characteristic literary productions of Western civilization from ancient times to the present. There are four divisions of the course (corresponding to the four semesters of Third and Second Class years) with the subtitles:

H721 I, Classical Literature

H722 II, Medieval and Renaissance Literature

H821 III, Continental Literature, 17th-19th Centuries

H822 IV, Continental Novels, 19th-20th Centuries



**H721 THE WESTERN LITERARY HERITAGE I: Classical Literature.**  
*Three Sem Hrs (3-0).*

Greece.

Greek mythology. Homeric Epic: *Iliad*. Hellenic humanism: the tragedies of Aeschylus, Sophocles, Euripides. Satiric comedy: Aristophanes. The historians: Herodotus, Thucydides, Xenophon.

Rome.

Roman Epic: Virgil, *Aeneid*. Roman comedy: Plautus and Terence. Caesar, *Commentaries*. Roman poetry: Catullus, Martial, Horace, Ovid.

Hebrew and Christian Scriptures.

*Preq: H101, H102.*

**H722 THE WESTERN LITERARY HERITAGE II: Medieval and Renaissance Literature.** *Three Sem Hrs (3-0).*

Medieval Europe

Medieval Epic: *Beowulf*; *The Nibelungenlied*. Romance Literature: *The Song of Roland*; *The Cid*; *Aucassin and Nicolette*; *The Romance of the Rose*; François Villon. Marco Polo, *Travels*. Dante, *The Divine Comedy*. Medieval drama. Goliardic verse.

The Renaissance.

Petrarch, *Sonnets*. Boccaccio, *Decameron*. Castiglione, *The Courtier*. Machiavelli, *The Prince*. Erasmus, *The Praise of Folly*. Rabelais, *Gar-*



*gantua and Pantagruel. Montaigne, Essays. Cellini, Autobiography.*  
*Prereq: H101, H102.*

**H723 SHAKESPEARE AND HIS CONTEMPORARIES.** *Three Sem Hrs (3-0).* Intensive study of the major dramatic works of Shakespeare against the background of Tudor and Stuart life and literature, especially the plays of Shakespeare's fellow dramatists of the English Renaissance. Special consideration of Shakespeare's thought, dramatic development, and literary stature, particularly as revealed by comparison of his plays with the dramatic works of his contemporaries. *Prereq: H101, H102.*

**H724 CLASSIC AMERICAN WRITERS.** *Three Sem Hrs (3-0).* Readings in the works of the major American literary figures of the 19th century: Poe, Emerson, Thoreau, Hawthorne, Whitman, Melville, Clemens, and Henry James; their literary careers, the sources (particularly the native sources) of their ideas and art, their significance as representatives of their times, and their contributions to American civilization. *Prereq: For 1/C and 2/C only.*

**H731 HISTORY OF RUSSIA TO 1917.** *Three Sem Hrs (3-0).* An introduction to the political, cultural, and social history of Russia from the founding of the Moscow Principality through its expansion down to 1914. The growth of national consciousness, drive, and objectives are emphasized, together with the factors fostering the anomalous survival of the principle of autocracy from the 13th-century Mongol invasion. *Prereq: H201.*

**H732 SOVIET HISTORY AND CONTEMPORARY PROBLEMS.** *Three Sem Hrs (3-0).* An examination into the development of the Soviet Union, detailing the overthrow of the Provisional Government, the Civil War, and the consolidation of power under Lenin, Stalin, and Khrushchev. Particular emphasis is placed on the various policies adopted by the Soviet regime in meeting its foreign and domestic problems, including economic, political, and social developments within the Union, in the Orient, and in Europe. *Prereq: H201.*

**H734 MODERN AFRICAN PROBLEMS.** *Three Sem Hrs (3-0).* This course is designed to provide an understanding of contemporary African problems and tensions and their international ramifications. It offers an introduction to African cultures and social institutions, then proceeds to a consideration of the impact of Western culture and technology and the consequent European political and economic domination, and concludes with an examination of current African reactions to this recent past and their implications for the West.

**H735 MODERN FAR EASTERN PROBLEMS.** *Three Sem Hrs (3-0).* This course is designed to provide an understanding of the recent history and contemporary problems of the Far East. It presents a brief introduction to traditional Oriental culture and institutions, proceeds to discuss the impact of Western culture, technology, and political systems in the 19th century, and concludes with an examination of the problems accompanying the emergence of Asian nationalism in the 20th century. *Prereq: H201.*

**H737 MODERN MIDDLE EASTERN PROBLEMS.** *Three Sem Hrs (3-0).* This course is designed to provide an understanding of the current international tensions and problems centered in the Middle Eastern area. A thorough

grounding is given in the essential elements of Middle Eastern history, culture, and sociology, and the problems of internal and international political tensions in the area are studied in detail. Special emphasis is placed upon problems of naval and diplomatic importance, including Middle East oil and the penetration of Soviet influence into the area. *Prereq: H201.*

**H738 LATIN AMERICAN HISTORY AND CONTEMPORARY PROBLEMS.** *Three Sem Hrs (3-0).* A survey designed to provide reasonable familiarity with the origins and growth of our southern neighbors. The complex threads of the struggle for independence, fragmentation by nationalism, and the rise of national leaders are subordinated in emphasis to the development of the forces shaping Pan-Americanism. The significance for Latin America, the United States, and the world of the ideal of "La Patria Grande" is explored. A reading knowledge of Spanish or Portuguese is desired though not required. *Prereq: H201.*

**H739 THE FAR EASTERN RELATIONS OF THE UNITED STATES.** *Three Sem Hrs. (3-0).* A consideration of the development of the diplomatic, cultural, and economic relations of the United States and the Far East. Special emphasis is placed on developments since 1850, particularly upon the interaction of the foreign policies of the United States with those of the major Far Eastern Powers as the latter were stimulated by imperialism, nationalism, industrialism, democracy, and communism. *Prereq: H201.*

**H743 POLITICAL THEORY.** *Three Sem Hrs (3-0).* A study of political philosophy, with emphasis on the roots of democracy; the writings of Plato, Aristotle, St. Thomas Aquinas, Machiavelli, Hobbes, Locke, Montesquieu, Rousseau, Burke, Hegel, Marx, the Fabians, John Dewey; the great documents—*Magna Carta*, the *Declaration of Independence*—and American theory of the Revolution. A major theme is the philosophic background for the present confrontation of individualistic democracy and Communist totalitarianism. *Prereq: H201.*

**H744 COMMUNISM: THEORY AND PRACTICE.** *Three Sem Hrs (3-0).* A study of the philosophy of communism from the writings of Engels, Marx, Lenin, and Stalin; history of the Internationals; the role of the Comintern and the "international party," relations of the Soviet Union with radical parties outside Russia and with European Social Democratic parties; policies in the satellite nations; and security problems in the Western democracies. *Prereq: H303.*

**H745 COMPARATIVE ECONOMIC SYSTEMS.** *Three Sem Hrs (3-0).* A study of the various possible methods of economic organization—in theory and in practice. An assessment in detail of the different solutions to the problems of production, distribution, and growth under free enterprise, mixed capitalism, and detailed economic planning. *Prereq: H304.*

**H746 FOREIGN POLITICAL INSTITUTIONS.** *Three Sem Hrs (3-0).* A comparative study of the governments of the United Kingdom, France, the German Federal Republic, the Soviet Union, Communist China, Japan, and India. The political institutions of each of these countries are studied in terms of (a) constitutional development, (b) policymaking machinery, (c) political parties and the formation of public opinion, (d) economic controls and social programs,

(e) foreign policy, (f) military policy and administration, (g) the legal system, and (h) relations with the international community. *Prereq: H303.*

**H748 INTERNATIONAL LAW.** *Three Sem Hrs (3-0).* A survey of the public law of nations including the law of peace and the law of war. The history and theory of international law are studied; problems and cases are used to make the subject live and current. Attention is given to the role of international law in international relations. *Prereq: H303.*

**H749 COMMUNIST CHINA.** *Three Sem Hrs (3-0).* An examination of the background and development of the Communist People's Republic of China to include the Chinese Communist Revolution and Civil War (1927-49). Further analysis deals with the economic, political, and foreign policies used by the Chinese Communists since 1949 up to the present. This analysis is integrated and evaluated with the original contributions of Mao Tse-tung to Communist theory to indicate the ideological content of Chinese Communist actions. Particular emphasis in this latter phase is directed to an analysis of Mao's strategic concept of revolutionary wars of national liberation and the utilization of guerrilla warfare by the emerging nations of Asia and Africa.

**H750 POLITICAL PARTIES AND GROUP POLITICS.** *Three Sem Hrs (3-0).* A study of the dynamics of group politics in the American system of government. The course demonstrates that political parties and interest groups have developed outside of the original constitutional framework to channel political power in the community and it emphasizes the roles played by parties, interest groups, public opinion, and elections in the American political process. The course is empirically oriented. *Prereq: H303.*

**H751 ECONOMIC STATISTICS.** *Three Sem Hrs (3-0).* Introduction to summarization techniques most commonly encountered in business, finance, and economic analysis: computation and interpretation of measures of central tendency, dispersion, and skewness; graphic and tabular presentation of univariate and bivariate distribution; special attention to theory and practice of index numbers and to parametric and non-parametric descriptions of economic time series. *Prereq: H304.*

**H752 ECONOMETRICS.** *Three Sem Hrs (3-0).* Quantification of basic economic theory: rational criteria for the selection of economic models underlying various mathematical forms extended to describe working economies; multiple regression and correlation techniques for the construction and testing of econometric models; and study of selected alternative models of particular current economic interest. *Prereq: H304.*

**H753 PRICE DETERMINATION AND DECISION-MAKING.** *Three Sem Hrs (3-0).* Intermediate level microeconomics: the theory of market price, factor-pricing, the dynamics of supply and demand, the regulation of competition and monopoly, indifference curves, welfare economics, and theory of valuation, plus some applications of economic reasoning to problems of choice in decision-making in business and in defense planning. *Prereq: H304.*

**H755 ADMINISTRATION IN GOVERNMENT.** *Three Sem Hrs (3-0).* A critical analysis, on an advanced level, of the federal administrative organization



as an integral part of the political system. The roles of the Presidency, Congress, the Judiciary, independent regulatory commissions, interest groups, political parties, and the public in the administrative process are stressed. Special attention is given to the forces and factors which comprise the environment of federal administration and affect policy-making and implementation. The course is empirically oriented. *Prereq: H303.*

**H821 THE WESTERN LITERARY HERITAGE III: Continental Literature, 17th–19th Centuries.** *Three Sem Hrs (3–0).* Cervantes, *Don Quixote*. Moliere, *Comedies*. Rousseau, *The Social Contract*. Voltaire, *Candide*. Goethe, *Faust*. *Prereq: H101, H102.*

**H822 THE WESTERN LITERARY HERITAGE IV: Continental Novels, 19th–20th Centuries.** *Three Sem Hrs (3–0).*

The French Novel.

Balzac, *Old Goriot*; Zola, *Germinal*; Proust, *Remembrance of Things Past*.

The Russian Novel.

Dostoevski, *Crime and Punishment*; Tolstoi, *War and Peace*; Turgenev, *Fathers and Sons*.

The German Novel.

Mann, *The Magic Mountain*.

*Prereq: H101, H102.*

**H831 EUROPE IN THE TWENTIETH CENTURY.** *Three Sem Hrs (3–0).* An examination of the developments which gave European nations their predominant importance in the first part of the 20th century and of the impact of two world wars, the great depression, and the cold war upon the domestic status of these nations and their positions in contemporary affairs. *Prereq: H201.*

**H834 MODERN EUROPEAN REVOLUTIONS.** *Three Sem Hrs (3–0).* A study of the origins, nature, and historical significance of the three great European revolutions of modern times which occurred in 17th-century England, 18th-century France, and 20th-century Russia. *Prereq: H201.*

**H835 AMERICAN COLONIAL HISTORY.** *Three Sem Hrs (3–0).* This course deals with the origins of American civilization from the Age of Discovery to 1763. Emphasis is placed upon the founding of the colonies and their development in the 17th and 18th centuries. Study is made of the American origins of such institutions as slavery, representative government, religion, law, and the military. *Prereq: H631.*

**H837 INTERNATIONAL TRADE AND FINANCE.** *Three Sem Hrs (3–0).* An introduction to the principles, practices, and institutions of international finance and trade. Included in the scope of the course are balance of payments, trade policies and agreements, financial and trade practices, and international agencies and their functioning in the area of finance and trade. *Prereq: H304.*

**H838 ECONOMIC DEVELOPMENT.** *Three Sem Hrs (3–0).* The study of theories of economic development as applied to contemporary problems in the field, with emphasis on population factors, geographic environment, and institutions as determinants of the rate of growth. The course includes consideration of foreign trade relationships, banking arrangements, and supply of domestic

and foreign capital. Some attention is given to problems of administering an AID program. *Prereq: H304.*

**H839 UNITED STATES MILITARY HISTORY AND POLICY.** *Three Sem Hrs (3-0).* A survey of U.S. military history and policy from Colonial times to the present. It provides extensive opportunity to analyze major land and sea campaigns, problems of logistics, the implementation of national policy by the military forces, the relationship between the U.S. military staffs and the civil government, the effect of airpower on strategy, and concepts of nuclear warfare. *Prereq: H932; or 1/C, with permission of instructor.*

**H840 ELEMENTS OF LAW.** *Three Sem Hrs (3-0).* The essentials of the law of crimes, contracts, torts, agency, real and personal property, domestic relations, testaments, negotiable instruments, and taxation, with a view of familiarizing the student with those branches of the law he is most likely to encounter in his role as a citizen and as an officer of the Armed Forces. *Prereq: H303.*

**H841 THE ECONOMICS OF DEFENSE.** *Three Sem Hrs (3-0).* Intermediate-level economic analysis, with emphasis on policy problems in war and cold war; production and manpower programming, allocation of materials, stockpiling, wage and price controls, rationing, wartime fiscal and monetary policies; and economic reasoning in Defense Department decision-making. *Prereq: H304.*

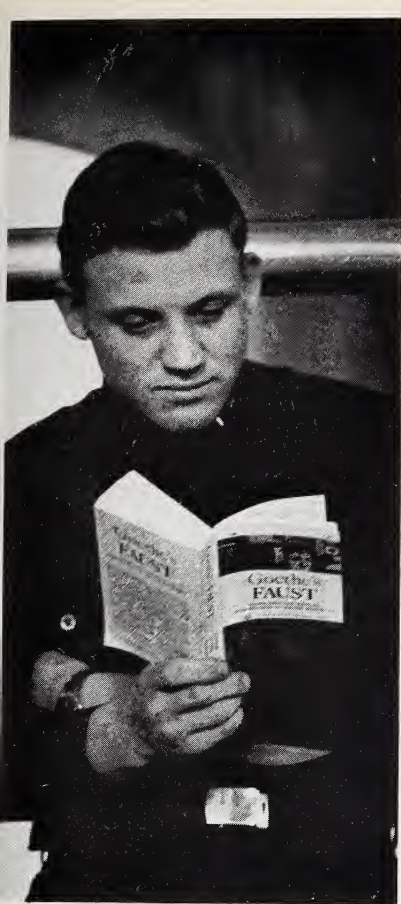
**H843 CONSTITUTIONAL LAW.** *Three Sem Hrs (3-0).* A survey of the basic principles of American constitutionalism. Included in this course are history of American constitutional development; implementation of separation of powers, federalism, and limited government; development and exercise of national powers; judicial function in constitutional cases; and introduction to civil rights and liberties. *Prereq: H303.*

**H845 PUBLIC FINANCE.** *Three Sem Hrs (3-0).* The study of all aspects of governmental financial activities and institutions, with emphasis on fiscal and monetary policy. Topics of study include the budget-making process, the role of the Council of Economic Advisers, the function of the Federal Reserve System, and tax policy at all levels of government. Emphasis is on U.S. institutions and practices. *Prereq: H304.*

**H846 ECONOMICS OF LABOR RELATIONS.** *Three Sem Hrs (3-0).* Designed to give the midshipman a general survey of the field of labor relations. A study is made of labor history in the United States, the organization of unions, the economics of the labor market, and the relationship between government and labor. Special attention is given to labor-management relations and current labor problems. *Prereq: H304.*

**H848 MONEY AND BANKING.** *Three Sem Hrs (3-0).* A systematic study of monetary standards, credit instruments, check clearance, deposit creation, interest rates, currencies, exchange notes, credit policies, and the role of central banks. *Prereq: H304.*

**H849 NATIONAL SECURITY POLICY.** *Three Sem Hrs (3-0).* A study of the theory and application of strategy and policy formulation and of the inter-relationship of foreign and military policies in U.S. national security. It stresses the roles of the intelligence function, diplomatic goals, economic and military



capabilities, and of government institutions and agencies in the creation of national policy and strategy. *Prereq: 1/C only, or permission of instructor.*

**H921 SEMINAR IN REPRESENTATIVE CONTEMPORARY NOVELISTS.** *Three Sem Hrs (3-0).* Intensive study of selected works of six modern novelists, Moravia, Camus, Silone, Faulkner, Greene, and Malraux, as representatives of contemporary points of view on political, social, and ethical problems of the 20th century. Discussions, collateral readings, reports, and individual reading projects. *Prereq: 1/C only, or permission of instructor.*

**H922 SEMINAR IN REPRESENTATIVE PLAYWRIGHTS.** *Three Sem Hrs (3-0).* Intensive study of modern drama, American, British, and Continental, as representative of contemporary points of view on the political, social, and ethical problems of the 20th century. Discussion, collateral readings, reports, and individual reading projects. *Prereq: 1/C only, or permission of instructor.*

**H924 SEMINAR IN CRITICAL EVALUATION OF LITERATURE.** *Three Sem Hrs (3-0).* Varieties of modern literary criticism; the approaches and uses of critical analysis and evaluation. The major endeavor in the course will be the writing of a substantial critical essay in which the aims and ideals of modern



*After-dinner  
speaking*



literary criticism are exemplified and the humanistic values of literature are stressed. *Prereq: 1/C only, or permission of instructor.*

**H932 SEMINAR IN THE PHILOSOPHY OF WAR.** *Three Sem Hrs (3-0).* A survey of the ethical and operational problems in war. It provides for the study of the causes and nature of war, an examination of limited and absolute war, the relationship between military staffs and civil governments, and an analysis of the writings of the leading men on the subject. *Prereq: 2/C only, or permission of instructor.*

**H933 SEMINAR IN RUSSIAN MILITARY AND NAVAL DOCTRINE.** *Three Sem Hrs (3-0).* The evolution of Russian strategic and tactical concepts, the interrelationship of armed services, the development of materiel, education and training, and illustrative campaigns. Emphasis is placed upon outstanding Russian formulators and practitioners of military and naval doctrine. The influence of Stalin upon Soviet military doctrine and its differences from conventional concepts are emphasized. A reading knowledge of the Russian language is desirable but not required. *Prereq: 1/C only, or permission of instructor.*

**H936 SEMINAR IN THE PHILOSOPHY OF HISTORY.** *Three Sem Hrs (3-0).* An analysis of the major schools of historical interpretation from the Hellenic era to Existentialism. Particular attention is paid to the philosophical and cosmological foundations of historical interpretation, the problems of causality, and the materialist-supernaturalist controversy. Readings and discussions. *Prereq: 1/C only, or permission of instructor.*

**H938 RESEARCH SEMINAR IN AREA STUDIES.** *Three Sem. Hrs (3-0).* A detailed analysis of the historic background and current developments of a particular region of the world with reference, wherever appropriate, to the objectives of U.S. foreign policy. Much time is devoted to discussion and examination of basic source materials and to a research paper in the chosen area of study. The areas examined include Africa, Europe, the Far East, Latin America, and the Middle East. *Prereq: 1/C only, or permission of instructor.*

**H942 RESEARCH SEMINAR IN POLITICS AND ECONOMICS.** *Three Sem Hrs (3-0).* A seminar in methodology and types of research materials in either politics or economics, with each student pursuing his own particular interest in a research paper. *Prereq: 1/C only, or permission of instructor.*

**H944 SEMINAR IN HISTORY.** *Three Sem Hrs (3-0).* After study of research methodology in the field of history, this seminar will meet in three different sections so that each midshipman may pursue his special interest in United States, European, or Naval history. In each section, major historical problems, institutions, and developments will be given intensive study through readings, reports, and discussions. Each midshipman will develop a research project and write a seminar paper. *Prereq: 1/C only, or permission of instructor.*

**AFTER-DINNER SPEAKING.** Throughout First Class Year, small dinners are given under the auspices of the English, History, and Government Department, with the primary objective of providing a setting for midshipman after-dinner speaking under realistic circumstances. Outside guests of honor and faculty members are present. Each member of the First Class participates in at least two of these dinners.

## MATHEMATICS DEPARTMENT

**Head of Department:** Captain J. W. Johnston; **Executive Officer:** Commander A. B. Snively III; **Senior Professor:** L. H. Chambers; **Professors:** J. R. Bland, E. Hawkins, N. H. Ball, A. E. Currier, R. P. Bailey, T. J. Benac, J. C. Abbott, E. E. Betz, S. S. Saslaw, C. P. Brady, V. N. Robinson, J. M. Holme, J. F. Paydon, R. C. Morrow, K. L. Palmquist, H. K. Sohl, W. H. Sears, Jr., J. Milkman, G. R. Strohl, Jr., J. A. Tierney, M. L. Kales; **Commanders:** W. F. Kelly, J. R. Throop; **Associate Professors:** J. F. Milos, H. L. Kinsolving, O. M. Thomas, M. V. Gibbons, E. C. Gras, W. J. Strange, B. H. Buikstra, J. R. Gorman, N. O. Niles, M. F. Stilwell, H. Wierenga, E. G. Swafford, C. E. Thompson, J. H. White, R. Molloy, A. A. Karwath, C. S. Wolfe, J. W. Jayne, H. M. Kaplan; **Lieutenant Commanders/Major:** W. H. Arata, L. P. Cuccias, J. J. Dittrick, J. H. Helm, (USMC), R. A. McConnel, H. F. Rempt; **Assistant Professors:** G. E. Culbertson, G. E. Haborak, W. J. Hildebrand, C. R. Nicolaysen, G. E. Schillinger, J. P. Edwards, Jr., D. C. Mayne, C. E. Moore, L. B. Palmer, R. A. O'Brien, Jr., D. J. Palmer, H. B. Coonce, L. E. Ewing, S. W. Mansour; **Lieutenants:** R. W. Atcheson, W. B. Barton, C. O. Cotey, T. F. Degnan, C. W. Ehler, D. Fecko, R. N. Leggett, R. F. Maruszewski, M. H. Merrill, R. D. Newmister, C. L. Robertson; **Lieutenants (j.g.):** C. S. Davis, L. J. Fransen, R. A. Ilka, D. R. Gregory.

### MISSION

The mission of the Mathematics Department is threefold, namely, (1) to teach mathematics as a basic science, (2) to provide midshipmen with a knowledge of fundamental mathematical concepts, and (3) to develop a facility for the use of mathematics in solving practical problems arising in other departments. The basic and elective courses are planned in such a manner as to be of the greatest possible assistance to the midshipmen in their work throughout the professional departments. Development of an analytic approach to problems and an understanding of basic principles involved is stressed throughout the courses taught. In addition to the required core courses, there are 24 elective courses offered.

### CORE COURSES

#### Basic Curriculum

(None)	Plane Trigonometry <sup>1</sup>	M215	Calculus III
M111	Calculus I	M224	Analysis IV <sup>2</sup>
M120	Calculus II	M309	Analysis V

<sup>1</sup> For those midshipmen not offering Trigonometry upon entrance.

<sup>2</sup> Variations may be made in the curricula of midshipmen completing Matrix Theory (M601).



### Half-Term Validation Curriculum <sup>1</sup>

M151	Calculus I-B	M228	Analysis IV-B <sup>2</sup>
M152	Calculus II-B	M309	Analysis V
M221	Calculus III-B		

<sup>1</sup> For midshipmen who have successfully completed a course in analytic geometry prior to entrance.

<sup>2</sup> Variations may be made in the curricula of midshipmen completing Matrix Theory (M601).

### MINORS PROGRAM

#### Mathematics

M601	Matrix Theory	<i>One course from:</i>	
<i>One course from:</i>		M722	Advanced Calculus II
M602	Modern Algebra	M752	Engineering Mathematics II
M604	Numerical Analysis	<i>Two courses from:</i> <sup>1</sup>	
M606	Probability and Statistics II	Mathematics, Science, Weapons,	
M671	Linear Programing	Naval Science, or Engineering.	
<i>One course from:</i>			
M721	Advanced Calculus I		
M751	Engineering Mathematics I		

<sup>1</sup> Selection of courses must be approved by Head of Math Department.

### MAJORS PROGRAM

#### Theoretical Mathematics

M601	Matrix Theory
M602	Modern Algebra
M721	Advanced Calculus I
M722	Advanced Calculus II
<i>Four courses from:</i>	
M802	Introduction to Complex Variable
M861	Linear Algebra
M862	Advanced Differential Equations I
M863	Advanced Differential Equations II
M864	Topology
M866	Algebraic Structures

#### Applied Mathematics

M601	Matrix Theory
<i>One course from:</i>	
M602	Modern Algebra
M604	Numerical Analysis

#### Applied Mathematics—Continued

M606	Probability and Statistics II
M671	Linear Programing
<i>Plus:</i>	
M721	Advanced Calculus I
M751	Engineering Mathematics I
M825	Methods of Applied Mathematics I
M826	Methods of Applied Mathematics II

*Two courses from:*

M802	Introduction to Complex Variable
M852	Operational Methods
M861	Linear Algebra
M862	Advanced Differential Equations I
M863	Advanced Differential Equations II
M864	Topology



## Course Descriptions

**PLANE TRIGONOMETRY.** Trigonometric functions; graphs; equations; slide rule solutions of triangles. For those midshipmen not offering trigonometry upon entrance. No credit granted.

**M111 CALCULUS I.** *Four Sem Hrs (4-0).* Functions of one variable; differentiation and integration; selected topics in analytic geometry; applications.

**M151 CALCULUS I-B.** *Four Sem Hrs (4-0).* Applications of differentiation; the definite integral; topics in analytic geometry; trigonometric and exponential function; vectors in a plane. For midshipmen validating one-half term of mathematics.

**M120 CALCULUS II.** *Four Sem Hrs (4-0).* Logarithmic and exponential functions; functions of several variables; multiple integrals; selected topics in analytic geometry; applications. *Prereq: M111.*

**M152 CALCULUS II-B.** *Four Sem Hrs. (4-0).* Formal integration with applications; solid analytic geometry; vectors in three dimensions; series; partial differentiation; multiple integration. *Prereq: M151.*

**M215 CALCULUS III.** *Four Sem Hrs (4-0).* A composite course covering the following topics in calculus, differential equations, and computer programming: *Calculus*—Infinite series; partial differentiation and multiple integration; *Differential Equations*—Introduction to differential equations; first and higher order differential equations with constant coefficients; *Computer Programming*—Introduction to computer programming; constants; variables; arithmetic statements; control statements; loops, input/output statements and subprograms. *Prereq: M120.*

**M221 CALCULUS III-B.** *Four Sem Hrs (4-0).* A composite course covering the following topics in differential equations and computer programming: *Differential Equations*—Introduction to differential equations; first and higher order differential equations; applications of differential equations; linear differential equations with constant coefficients; Laplace transforms; applications of linear differential equations with constant coefficients; series and numerical solutions of differential equations and partial differential equations; *Computer Programming*—Introduction to computer programming; constants; variables; arithmetic statements; control statements; loops; input/output statements and subprograms. *Prereq: M152 or M213.*

**M224 ANALYSIS IV** *Four Sem Hrs (4-0).* A composite course covering the following topics in differential equations and linear algebra: *Differential Equations*—Laplace transform; application of linear differential equations with constant coefficients; simultaneous equations; series and numerical solutions; partial differential equations; *Linear Algebra*—Matrix algebra; linear systems; determinants; vector spaces; characteristic values. *Prereq: M215.*

**M226 ANALYSIS IV-A.** *Three Sem Hrs (3-0).* For those midshipmen who are taking or have had Matrix Theory (M601). *Differential Equations*—Laplace transform; applications of linear differential equations with constant coefficients; simultaneous equations; series solutions; numerical solutions; partial differential



equations; separation of variables; boundary problems; Fourier series. *Prereq:* M215.

**M228 ANALYSIS IV-B.** *Four Sem Hrs (4-0).* A composite course covering differential equations, linear algebra, and linear programming as follows: *Differential Equations*—Partial differential equations; separation of variables; boundary value problems; Fourier series; *Linear Algebra*—Matrix algebra; linear systems; determinants; vector spaces; characteristic values; *Linear Programming*—Linear inequalities; min-max problem; transportation problem; simplex method; game theory. *Prereq:* M221.

**M309 ANALYSIS V.** *Three Sem Hrs (3-0).* A first course in probability theory and statistics covering the following topics: *Probability*—Sets; sample spaces and events; conditional probability and independence; one-dimensional random variable; distribution functions; sums of random variables; *Statistics*—Sampling, estimation of parameters; testing hypotheses. *Prereq:* M221.

**M311 ANALYSIS V-B.** *Four Sem Hrs (4-0).* A composite course covering the following topics in probability, statistics, and linear programming: *Probability*—Sets; sample spaces and events; conditional probability and independence; one-dimensional random variable; distribution functions; sums of random variables; *Statistics*—Sampling; estimation of parameters; testing hypotheses; *Linear Programming*—Linear inequalities; min-max problems; transportation problem; simplex method; game theory. *Prereq:* M224, M226, or M228.

**M502 FUNDAMENTALS OF MATHEMATICS.** *Three Sem Hrs (3-0).* Logic; the number system; logic of algebra; mathematical induction; cardinal number; groups.

**M601 MATRIX THEORY.** *Three Sem Hrs (3-0).* Algebra of matrices; transformations; bilinear forms; rank; systems of linear equations; quadratic forms; linear vector spaces; determinants; characteristic matrix. *Prereq:* M120, M152, or M213.

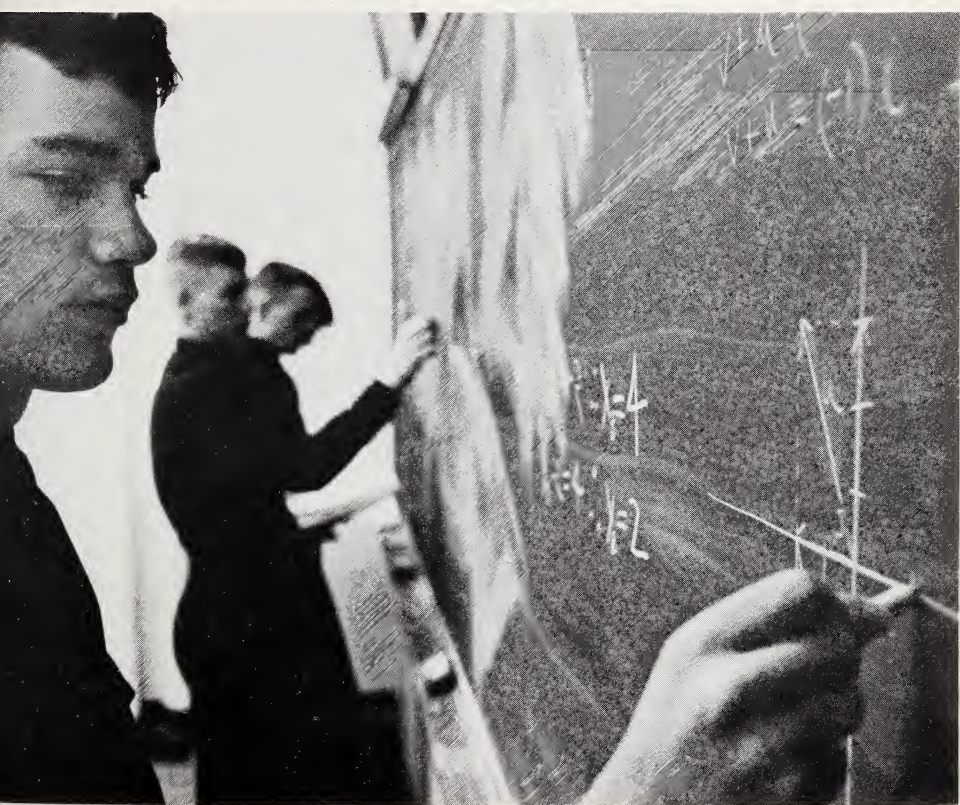
**M602 MODERN ALGEBRA.** *Three Sem Hrs (3-0).* Fundamental concepts; sets, relations, operations; rings; integers; fields; number fields; rational numbers, real numbers, complex numbers, groups; algebra of matrices. *Prereq:* M120, M152, or M213.

**M604 NUMERICAL ANALYSIS.** *Three Sem Hrs (3-0).* Practical solution of algebraic and transcendental equations; finite differences and their applications; numerical integration of initial value problems; numerical integration of ordinary boundary value problems. *Prereq:* M120, M152, or M213.

**M606 PROBABILITY AND STATISTICS II.** *Three Sem Hrs (3-0).* Sampling theory; analysis of pairs of measurements; theoretical frequency functions for correlation and regression; the chi-square distribution; small sample theory (student's *T* and *F* distribution); general principles for testing hypotheses and for estimation; non-parametric methods. *Prereq:* M309 or M311.

**M608 VECTOR ANALYSIS.** *Three Sem Hrs (3-0).* Geometry and algebra of vectors; vector calculus and vector fields; line and surface integrals; Stokes' and Gauss' theorems; applications. *Prereq:* M215 or M221.

**M652 VECTOR MECHANICS.** *Three Sem Hrs (3-0).* Vectors; velocity and acceleration components; impulse-momentum; work energy; conservative forces





and potential energy, momentum; central forces; inverse-square law; Kepler's laws; velocity patterns and reference frames; plane and general motion of a rigid body; theorem of Coriolis; dynamics of a rigid body; conservative force fields; equilibrium of fluids; gradient, curl; Stokes' theorem; divergence; equation of continuity. *Prereq: M215 or M221.*

**M671 LINEAR PROGRAMING.** *Three Sem Hrs (3-0).* The transportation problem, the simplex algorithm, the dual problem, the final tableau and an introduction to game theory. *Prereq: M601.*

**M704 MATHEMATICS FOR ENGINEERS AND PHYSICISTS.** *Three Sem Hrs (3-0).* To include topics from matrix theory, vector analysis, partial differential equations, complex variables. *Prereq: M224, M226, or M228.*

**M721 ADVANCED CALCULUS I.** *Three Sem Hrs (3-0).* Real and complex number systems; set theory; numerical sequences and series; continuity; differentiation; the Riemann Stieltjes integral; sequences and series of functions. *Prereq: M224, M226, or M228.*

**M722 ADVANCED CALCULUS II.** *Three Sem Hrs (3-0).* Power series; Fourier series; orthogonal functions; of several variables; integration. *Prereq: M721.*

**M751 ENGINEERING MATHEMATICS I.** *Three Sem Hrs (3-0).* Vector analysis; line, surface and volume integrals; Green's theorem, Stokes' theorem; Fourier analysis; partial differential equations, Bessel function, applications, Legendre polynomial, differentiation under the integral sign. *Prereq: M224, M226, or M228.*

**M752 ENGINEERING MATHEMATICS II.** *Three Sem Hrs (3-0).* Laplace transformation and selected supporting topics from complex variable (analytic functions, residues, etc.). *Prereq: M224, M226, or M228.*

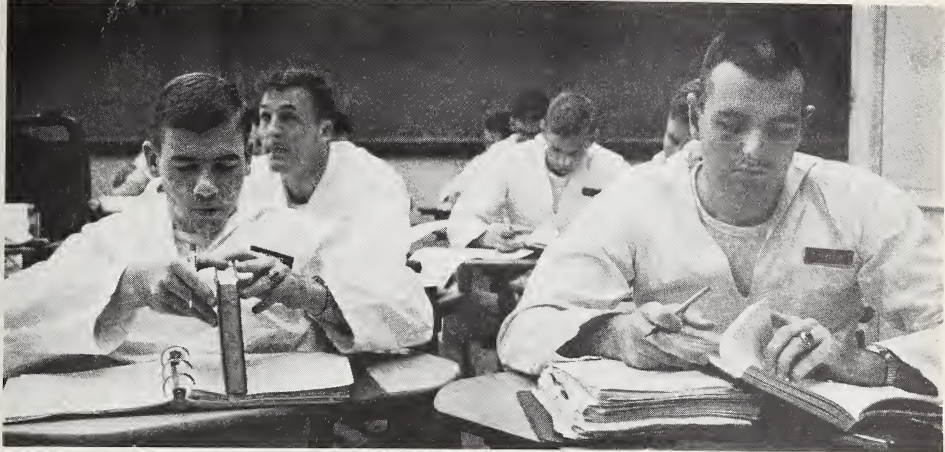
**M770 INTRODUCTION TO MATHEMATICAL ECONOMICS.** *Three Sem Hrs (3-0).* Simple dynamic models; theory of the multiplier; the acceleration principle; linear difference equations; trade-cycle theory; economic regulation and allocation of resources. *Prereq: M215 or M221; M601 and permission of the instructor.*

**M802 INTRODUCTION TO COMPLEX VARIABLE.** *Three Sem Hrs (3-0).* Analytic functions; elementary functions; integrals; series; residues and poles; conformal mapping and applications; analytic continuation Riemann surfaces. *Prereq: M721.*

**M825 METHODS OF APPLIED MATHEMATICS I.** *Three Sem Hrs (3-0).* Programming in Fortran; summation of series; truncation error; solution of equations by iterative methods; computations associated with matrices; characteristic value problems; interpolation; mechanical quadratures; difference and differential equations. *Prereq: M601, M721, and permission of the instructor.*

**M826 METHODS OF APPLIED MATHEMATICS II.** *Three Sem Hrs (3-0).* Review of classical methods for the initial value problem in differential equations; Euler-Cauchy, Adams, Milne, Runge-Kutta methods; prediction and correction iterations; convergence and stability; deferred iteration; two-point bound





dary value problems and eigenvalue problems; strong, inherent, and partial instability. Numerical solutions of partial differential equations. *Prereq: M825, M751, and permission of the instructor.*

**M852 OPERATIONAL METHODS.** *Three Sem Hrs (3-0).* Application of Laplace and Fourier transforms to the analysis of the problems of science and engineering involving ordinary differential equations and the boundary value problems of partial differential equations. *Prereq: M802, and permission of instructor.*

**M861 LINEAR ALGEBRA.** *Three Sem Hrs (3-0).* An abstract treatment of vector spaces and linear transformations with applications to algebra, analysis, and geometry. *Prereq: M601, M602, M722, and permission of instructor.*

**M862 ADVANCED DIFFERENTIAL EQUATIONS I.** *Three Sem Hrs (3-0).* A modern treatment of existence, uniqueness, oscillation and comparison theorems. The theory of stability of solutions. Topological methods. *Prereq: M722, and permission of instructor.*

**M863 ADVANCED DIFFERENTIAL EQUATIONS II.** *Three Sem Hrs (3-0).* Plane autonomous systems; approximate solutions; stability, regular singular points; Sturm-Liouville systems; expansions in eigenfunctions. *Prereq: M802, M862, and permission of instructor.*

**M864 TOPOLOGY.** *Three Sem Hrs (3-0).* Topics to include sets and functions, metric spaces, topological spaces, compactness, separation, connectedness, Stone-Weierstrauss, theorem and an introduction to Banach and Hilbert spaces. *Prereq: M601, M602, M721, and permission of instructor.*

**M866 ALGEBRAIC STRUCTURES.** *Three Sem Hrs (3-0).* Groups; structure theorems; extension fields; elements of Galois theory. *Prereq: M602, M722, and permission of instructor.*

**M902-903 MATHEMATICS RESEARCH PROJECT.** *Three Sem Hrs Each Term (3-0, 3-0).* A creative, mathematics research project in the field of the student's interest, approved by the Mathematics Research Adviser in the Department. If the project is of sufficient magnitude or depth, it may be continued for a second semester. *Prereq: Approval of Head of Department.*

## MODERN LANGUAGES DEPARTMENT

**Head of Department:** Captain K. G. Haynes; **Executive Officer:** Commander G. D. Florence; **Senior Professor:** J. D. Yarbrow; **Professors:** C. P. Lemieux, R. F. Muller, H. W. Drexel, A. R. Hefler, W. H. Berry, J. H. Elsdon, G. J. Riccio, R. A. Farley, J. E. Griffiths; **Associate Professors:** W. H. Buffum, C. R. Michaud, H. R. Keller, Jr., C. A. Pritchard, K. E. Lappin, W. W. Sewell, K. P. Roderbourg, E. J. Satterthwaite, J. A. Hutchins, E. A. DeRosa; **Lieutenant Commanders:** I. S. Serpa, Brazilian Navy, I. Fleuriot de Langle, French Navy, G. Fazio, Italian Navy, C. von Criegern, Federal German Navy, M. Viveros, Mexican Navy, W. F. Hardin; **Assistant Professors:** V. S. Tolstoy, G. H. Koenig, R. J. Trivelli, F. J. Dannerbeck; **Lieutenants:** M. F. Treacy, R. D. de la Garza, L. R. Greig; **Instructor:** M. E. Grivsky; **Lieutenant (j.g.):** H. K. Mussler.

### MISSION

The Modern Languages Department provides opportunities for midshipmen to develop proficiency in any of seven languages, and to gain significant knowledge of the related foreign areas, peoples, and cultures.

### FACILITIES

The Department is equipped with a tape-recording studio, high-speed tape duplicators, extensive tape libraries, and language laboratory facilities. Tapes for all lessons in the basic and intermediate courses are supplied to midshipmen and some 900 tape recorder-playback units are loaned for use in individual midshipmen's rooms in Bancroft Hall.

A variety of tape-recorded material is also available for class or individual use in advanced elective courses. Visual aids, such as sound motion picture films, transparencies, slides, pictures, charts, and maps are used to highlight geographic, cultural, and other background features of the areas and civilizations under discussion.

### CORE COURSES

L101-102C	Basic Chinese	L101-102P	Basic Portuguese
L101-102F	Basic French	L101-102R	Basic Russian
L101-102G	Basic German	L101-102S	Basic Spanish
L101-102I	Basic Italian		

## MINORS PROGRAM

### French

L201-202F	Intermediate French
L701-702F	Advanced French
L805-806F	French Area and Civilization

### Italian

L201-202I	Intermediate Italian
L701-702I	Advanced Italian
L805-806I	Italian Area and Civilization

### Russian

L201-202R	Intermediate Russian
L703-704R	Advanced Russian
L805-806R	Russian Area and Civilization

### German

L201-202G	Intermediate German
L701-702G	Advanced German
L805-806G	German Area and Civilization

### Portuguese

L201-202P	Intermediate Portuguese
L701-702P	Advanced Portuguese
L805-806P	Brazilian and Portuguese Area and Civilization

### Spanish

L201-202S	Intermediate Spanish
L701-702S	Advanced Spanish
L807S	Spanish Civilization
L808S	Spanish-American Civilization

**Note:** L201-202 may be validated. In special cases, with approval of the Head of Department, certain other 700-800 level language courses may be substituted for L701-702 or L805-806 (or L807-808 in Spanish).

## MAJORS PROGRAM

Requirements are 36 semester hours (including L101-102) in the same language. Six of these hours are to be selected from optional courses marked by asterisk.

### French

L201-202F	Intermediate French
L701-702F	Advanced French
L713-714F	Survey of French Literature
L805-806F	French Area and Civilization
L811-812F	Contemporary French Literature*
L813F	The Age of Ideas in French Literature*
L814F	The Nineteenth Century Novel in France*
L815F	Selected Plays of the French Theater*
L817F	Techniques of Trans- lation*

### German

L201-202G	Intermediate German
L701-702G	Advanced German
L713-714G	Survey of German Literature
L801-802G	Goethe, Schiller, and Lessing*
L805-806G	German Area and Civilization
L807-808G	German Naval History*
L811-812G	German Literature of the Twentieth Century*
L715-716G	Scientific German*
L901-902G	Independent Foreign Language Study Project*



L822F	The French Navy*		<b>Portuguese</b>
L901-902F	Independent Foreign Language Study Project*	L201-202P	Intermediate Portuguese
		L701-702P	Advanced Portuguese
		L713-714P	Survey of Brazilian and Portuguese Literature
	<b>Italian</b>	L805-806P	Brazilian and Portuguese Areas and Civilization
L201-202I	Intermediate Italian	L807P	Modern Brazilian Novel
L701-702I	Advanced Italian	L822P	Brazilian Naval History
L713-714I	Survey of Italian Literature	L901-902P	Independent Foreign Language Study Project*
L802I	Dante and His Times		
L805-806I	Italian Area and Civilization		
L822I	The Italian Navy		
L901-902I	Independent Foreign Language Study Project*		
	<b>Russian</b>		<b>Spanish</b>
L201-202R	Intermediate Russian	L201-202S	Intermediate Spanish
L703-704R	Advanced Russian	L701-702S	Advanced Spanish
L705-706R	The Soviet Press*	L713-714S	Survey of Spanish Literature
L711-712R	Scientific Russian*	L805-806S	Survey of Spanish-American Literature*
L713-714R	Survey of Russian Literature	L807S	Spanish Civilization
L802R	The Nineteenth Century Russian Novel*	L808S	Spanish-American Civilization
L803R	Anton P. Chekhov*	L813S	Contemporary Spanish Literature*
L805-806R	Russian Area and Civilization	L814S	Contemporary Spanish-American Literature*
L822R	The Soviet Navy*	L901-902S	Independent Foreign Language Study Project*
L901-902R	Independent Foreign Language Study Project*		

## Course Descriptions

**L101 & L102C BASIC CHINESE.** *Three Sem Hrs Each Term (3-0, 3-0).* A beginning course in modern Chinese (Mandarin), concentrating on development of listening and speaking skills. Includes study of structure and an introduction to the writing system. Preparation for recitations will be done largely with tape-recorded materials.

**L101 & L102 BASIC FRENCH, GERMAN, ITALIAN, PORTUGUESE, RUSSIAN, SPANISH.** *Three Sem Hrs Each Term (3-0, 3-0).* A foundation course concentrating on development of hearing and speaking skills. Aims at fluency in use of speech patterns exemplifying the basic structures of the language, with



control of basic vocabulary and simple phraseology of everyday situations. Basic reading skill is a secondary goal. Writing is limited to material first mastered orally.

**L101E & L102E ENGLISH FOR NON-NATIVE SPEAKERS.** *Three Sem Hrs Each Term (3-0, 3-0).* This course is designed as an alternate to H101-102 for midshipmen who are not native speakers of English and who need to strengthen their proficiency in this language. Aims to develop high-level skills in understanding, speaking, reading, and writing. Includes extensive aural-oral drills on pronunciation, intonation, and speech patterns, rapid reading exercises, general conversation, practice in theme writing, and a thorough review of grammar. *Prereq: Permission of Head of Modern Languages Department, following recommendation of Head of English, History, and Government Department.*

**L201C & L202C INTERMEDIATE CHINESE.** *Three Sem Hrs Each Term (3-0, 3-0).* Continues development of listening and speaking skills, and understanding of structure. Includes practice in character recognition and reading of modern colloquial materials. *Prereq: L101-102C or equivalent.*

**L201 & L202 INTERMEDIATE FRENCH, GERMAN, ITALIAN, PORTUGUESE, RUSSIAN, SPANISH.** *Three Sem Hrs Each Term (3-0, 3-0).* Continues emphasis on oral work and mastery of speech patterns; develops reading and writing skills; includes area and cultural topics in conversations and readings. *Prereq: L101-102 or equivalent.*

**L701 & L702 ADVANCED FRENCH, GERMAN, ITALIAN, PORTUGUESE, SPANISH, and L703 & L704 ADVANCED RUSSIAN.** *Three Sem Hrs Each Term (3-0, 3-0).* Designed for students who, possessing good intermediate knowledge and skills in their foreign language, are ready to develop an extensive active vocabulary and a high degree of proficiency in speaking, reading, and writing. Provides ample practice in oral expression, with conversations and brief reports on selected topics, and in writing, with systematic exercises on

advanced syntax and idiomatic phrasing. Conducted in the foreign language. *Prereq: L201-202 or equivalent.*

**L901 & L902 INDEPENDENT FOREIGN LANGUAGE STUDY PROJECT.** *Three Sem Hrs Each Term (3-0, 3-0).* Offered in French, German, Italian, Portuguese, Russian, or Spanish. For especially well qualified midshipmen who, after completing the minor in a language, desire to carry out an independent reading-study program in that language. Individual projects will normally deal with topics or readings in the fields of literature, area, and civilization. Each project must be approved by the prospective instructor and by the head of the language division concerned. May be taken for one semester or for two. *Prereq: Completion of minor in language concerned and permission of the Head of Modern Languages Department.*

## **FRENCH**

**L713F & L714F SURVEY OF FRENCH LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Comprehensive study of major French works from the Middle Ages to the present, with emphasis on those essential to an understanding of the French character and cultural heritage. Conducted in French. Two terms, but each term may be taken independently. *Prereq: L701-702F, or permission of Head of Department.*

**L805F - L806F FRENCH AREA AND CIVILIZATION.** *Three Sem Hrs Each Term (3-0, 3-0).* Readings and discussions leading to extensive knowledge and understanding of France and the French people today. Topics include the major aspects of French history, geography, resources, economy, government, institutions, and present-day cultural life. Conducted in French. Two terms, but each term may be taken independently. *Prereq: L701-702F, or permission of Head of Department.*

**L811F & L812F CONTEMPORARY FRENCH LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Reading and discussion of selected works of the most significant modern French authors, including Proust, Gide, Romain, Mauriac, Malraux, Sartre, and Camus. Emphasis given to the social, moral, and intellectual currents influencing French life and attitudes from 1900 to the present. Text analysis, critical discussion, and lectures. Conducted in French. Two terms, but each term may be taken independently. *Prereq: L701-702F, or permission of Head of Department.*

**L813F THE AGE OF IDEAS IN FRENCH LITERATURE.** *Three Sem Hrs (3-0).* Study and discussion of French 18th-century thought as expressed in literature. Included are "les philosophes," Montesquieu, Diderot and *l'Encyclopédie*, Voltaire, and Rousseau. Conducted in French. *Prereq: L701-702F, or permission of Head of Department.*

**L814F THE NINETEENTH CENTURY NOVEL IN FRANCE.** *Three Sem Hrs (3-0).* Reading and discussion of works of Vigny, Balzac, Stendhal, Flaubert, Zola, and others. Conducted in French. *Prereq: L701-702F, or permission of Head of Department.*

**L815F SELECTED PLAYS OF THE FRENCH THEATER.** *Three Sem Hrs*





*Students of French—at home and abroad*

(3-0). Reading and discussion of plays of representative French dramatists including Molière, Racine, Corneille, Beaumarchais, Hugo, Rostand, Pagnol. Conducted in French. *Prereq: L701-702F, or permission of Head of Department.*

**L817F TECHNIQUES OF TRANSLATION.** *Three Sem Hrs (3-0).* Analysis of basic techniques and procedures for accurate translation, French to English and English to French. Familiarization with use of principal tools: selected dictionaries, glossaries, manuals, and other reference works. Extensive practice in translating materials (from professional, social and literary fields) chosen for their usefulness to naval officers. *Prereq: L701-702F, or permission of Head of Department.*

**L822F THE FRENCH NAVY.** *Three Sem Hrs (3-0).* Starting with a brief survey of French naval history and traditions, this course deals with the present-day French Navy. Main topics are its organization ashore and afloat, ships, equipment, materiel, personnel, and training programs, as well as its mission, doctrines, and strategy. Readings, discussions, and reports based on current French military and naval publications. Conducted in French. *Prereq: L701-702F, or permission of Head of Department.*

## **GERMAN**

**L713G & L714G SURVEY OF GERMAN LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Comprehensive study of major German works of the various periods. Emphasis given to those essential to understanding of German thought and attitudes. Conducted in German. Two terms, but each term may be taken independently. *Prereq: L701-702G, or permission of Head of Department.*

**L715G & L716G SCIENTIFIC GERMAN.** *Three Sem Hrs Each Term (3-0, 3-0).* Advanced reading and discussion of current German scientific and technical writings. Materials selected from periodicals, science textbooks, and reference works. Collateral readings and oral reports. Conducted in German. Two terms, but each term may be taken independently. *Prereq: L701-702G, or permission of Head of Department.*

**L801G & L802G. GOETHE, SCHILLER, AND LESSING.** *Three Sem Hrs Each Term (3-0,3-0).* Selected works from three greatest German writers. Their influence on the literature and history of the times will be emphasized. Conducted in German. Two terms, but each term may be taken independently. *Prereq: L701-702G, or permission of Head of Department.*

**L805G & L806G GERMAN AREA AND CIVILIZATION.** *Three Sem Hrs Each Term (3-0, 3-0).* Readings and discussions designed to provide thorough knowledge and understanding of Germany and the German people today. The history of the many nations which make up modern Germany will be discussed. Other topics will include geography, resources, economy, government, institutions, present-day civilization and culture, and Germany's role in current affairs. Conducted in German. Two terms, but each term may be taken independently. *Prereq: L701-702G, or permission of Head of Department.*

**L807G & L808G GERMAN NAVAL HISTORY.** *Three Sem Hrs Each Term*



(3-0, 3-0). Readings and discussion of German naval concepts and activities, with emphasis on World War II. This course is designed to broaden the midshipman's knowledge of naval-military history and to give him a better perspective of his chosen profession. From the standpoint of language, the class conversations develop active control of naval-military terminology, as well as standard vocabulary. Conducted in German. Two terms, but each term may be taken independently. *Prereq: L701-702G, or permission of Head of Department.*

**L811G & L812G GERMAN LITERATURE OF THE TWENTIETH CENTURY.** *Three Sem Hrs Each Term (3-0, 3-0).* Study and discussion of literary movements and selected authors: Hauptmann, Mann, Hesse, Borchert, Kafka, Langgässer, Wiechert, Schnitzler, von Hofmannsthal, Dürrenmatt and others. Conducted in German. Two terms, but each term may be taken independently. *Prereq: L701-702G, or permission of Head of Department.*

## ITALIAN

**L713I & L714I SURVEY OF ITALIAN LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Reading and discussion of major works from the pre-Renaissance period to modern times. Emphasis given to works which best exemplify the Italian character and cultural heritage. Conducted in Italian. Two terms, but each term may be taken independently. *Prereq: L701-702I, or permission of Head of Department.*

**L802I DANTE AND HIS TIMES.** *Three Sem Hrs (3-0).* In this course the *Divina Commedia* is read and discussed in the light of the literary, political, and religious ideals of the Middle Ages. Conducted in Italian. *Prereq: L701-702I, or permission of Head of Department.*

**L805I & L806I ITALIAN AREA AND CIVILIZATION.** *Three Sem Hrs Each Term (3-0, 3-0).* Readings and discussions designed to provide extensive knowledge and understanding of Italy and the Italian people of today. Topics include the major aspects of Italian history, geography, resources, economy, government, institutions, and present day civilization. Conducted in Italian. Two terms, but each term may be taken independently. *Prereq: L701-702P, or mission of Head of Department.*

**L822I THE ITALIAN NAVY.** *Three Sem Hrs (3-0).* Starting with a brief historical survey of its origins and traditions, and its activities in the two World Wars, this course deals primarily with the Italian Navy in the contemporary period. Main topics are its mission and doctrines, organization ashore and afloat, ships, equipment, personnel, and training programs. Readings, reports, and discussions are based on current Italian military and naval publications. Conducted in Italian. *Prereq: L701-702I, or permission of Head of Department.*

## PORTUGUESE

**L713P & L714P SURVEY OF BRAZILIAN AND PORTUGUESE LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Reading and discussion of major works which best illustrate the national characteristics, life, and attitudes





of the Brazilian and Portuguese peoples. Conducted in Portuguese. Two terms, but each term may be taken independently. *Prereq: L701-702P, or permission of Head of Department.*

**L805P & L806P BRAZILIAN AND PORTUGUESE AREAS AND CIVILIZATION.** *Three Sem Hrs Each Term (3-0, 3-0).* Readings and discussions designed to provide extensive knowledge and understanding of Brazil and Portugal and their peoples. Topics include the major aspects of Portuguese and Brazilian history, character of populations, geography, economy, governments, institutions, development projects, and cultural life. Conducted in Portuguese. Two terms, but each term may be taken independently. *Prereq: L701-702P, or permission of Head of Department.*

**L807P MODERN BRAZILIAN NOVEL.** *Three Sem Hrs (3-0).* Study and discussion of representative works by contemporary novelists such as Jorge Amado, Graciliano Ramos, Jose Lins do Rego, Rachel de Queiroz, and Erico

Verissimo. Conducted in Portuguese. *Prereq: L701-702P, or permission of Head of Department.*

**L822P BRAZILIAN NAVAL HISTORY.** *Three Sem Hrs (3-0).* Starting with a study of the Portuguese era of maritime discovery and colonization, the course continues with these topics: establishment of the Brazilian Navy in 1808; maritime development and naval operations in the 19th century; role of the Brazilian Navy in both World Wars; present-day Brazilian Defense and Naval organization and doctrines; the modern Brazilian Navy; United States-Brazilian defense relations, with emphasis on naval affairs; and Operations Unitas. Readings, discussions, and reports based on Portuguese and Brazilian naval-military periodicals, books, and documents. Conducted in Portuguese. *Prereq: L701-702P, or permission of Head of Department.*

## **RUSSIAN**

**L705R & L706R THE SOVIET PRESS.** *Three Sem Hrs Each Term (3-0, 3-0).* An introduction to the style and content of the Soviet press. Current Russian publications will be read and analyzed with attention to the selective nature of the Soviet press. In addition to giving insight into current problems of Soviet policy, this course aims to prepare the midshipman for research in the field of Russian and Soviet affairs. Conducted in Russian. Two terms, but each term may be taken independently. *Prereq: L703-704R, or permission of Head of Department.*

**L711R & L712R SCIENTIFIC RUSSIAN.** *Three Sem Hrs Each Term (3-0, 3-0).* An advanced reading course in current Soviet scientific literature. Material selected from periodicals, textbooks, and encyclopedias. Attention given to administrative framework of theoretical and applied research. Conducted in Russian. Two terms, but each term may be taken independently. *Prereq: L703-704R, or permission of Head of Department.*

**L713R & L714R SURVEY OF RUSSIAN LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Reading and discussion of selections which best illustrate Russian life, character traits, attitudes, and environment. Conducted in Russian. Two terms, but each term may be taken independently. *Prereq: L703-704R, or permission of Head of Department.*

**L802R THE NINETEENTH CENTURY RUSSIAN NOVEL.** *Three Sem Hrs (3-0).* Readings from the works of L. N. Tolstoy, I. S. Turgenev, F. M. Dostoevsky. Reports and discussions in Russian. Conducted in Russian. *Prereq: L703-704R, or permission of Head of Department.*

**L803R ANTON P. CHEKHOV.** *Three Sem Hrs (3-0).* Study of selected plays and short stories of A. P. Chekhov. Objective is to increase mastery of contemporary Russian vocabulary and to develop an understanding of Chekhov's world. Conducted in Russian. *Prereq: L703-704R, or permission of Head of Department.*

**L805R & L806R RUSSIAN AREA AND CIVILIZATION.** *Three Sem Hrs Each Term (3-0, 3-0).* Readings and discussions designed to provide extensive knowledge and understanding of Russia and the Soviet peoples. Topics include

the major aspects of Russian history, character of populations, geography, resources, government, institutions, and cultural life. Conducted in Russian. Two terms, but each term may be taken independently. *Prereq: L703-704R, or permission of Head of Department.*

**L822R THE SOVIET NAVY.** *Three Sem Hrs (3-0).* A study of the present character and potential of the Soviet Navy. Brief historical introduction, followed by discussions and reports on current Russian naval organization, doctrine, strategy, personnel, training programs, theaters of operation, ships and materiel. Group assignments and individual collateral readings based on Russian military and naval periodicals, newspapers, pamphlets, and books. Conducted in Russian. *Prereq: L703-704R, or permission of Head of Department.*

## **SPANISH**

**L713S & L714S SURVEY OF SPANISH LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Reading and discussion of works which best illustrate the Spanish character and personality, attitudes, environment, and cultural heritage. The program includes masterpieces from the various periods with background readings and lectures on the major literary movements. Conducted in Spanish. Two terms, but each term may be taken independently. *Prereq: L701-702S, or permission of Head of Department.*

**L805S & L806S SURVEY OF SPANISH-AMERICAN LITERATURE.** *Three Sem Hrs Each Term (3-0, 3-0).* Readings and discussion of works which best illustrate Spanish-American characters, attitudes, environment, and cultural life. Includes major works from various countries, with background readings and lectures on major literary movements. Conducted in Spanish. Two terms, but each term may be taken independently. *Prereq: L701-702S, or permission of Head of Department.*

**L807S SPANISH CIVILIZATION.** *Three Sem Hrs (3-0).* Readings and discussions on the most significant aspects of Spain's history, people, geography, resources, institutions, and cultural life. Conducted in Spanish. *Prereq: L701-702S, or permission of Head of Department.*

**L808S SPANISH-AMERICAN CIVILIZATION.** *Three Sem Hrs (3-0).* Readings and discussion on the areas and peoples of Spanish America, with emphasis given to major aspects of geography, resources, history, institutions, and customs of selected countries. Conducted in Spanish. *Prereq: L701-702S, or permission of Head of Department.*

**L813S CONTEMPORARY SPANISH LITERATURE.** *Three Sem Hrs (3-0).* Reading and discussion of novels, plays, essays and poetry of outstanding writers since the Generation of 1898. Conducted in Spanish. *Prereq: L701-702S, or permission of Head of Department.*

**L814S CONTEMPORARY SPANISH-AMERICAN LITERATURE.** *Three Sem Hrs (3-0).* Reading and discussion of novels, plays, essays and poetry reflecting major literary, social, and philosophical movements from the late nineteenth century to the present. Conducted in Spanish. *Prereq: L701-702S, or permission of Head of Department.*



## NAVAL SCIENCE DEPARTMENT

**Head of Department:** Captain W. C. Nicklas, USN; **Executive Officer:** Commander M. M. Gunter, Jr., USN; **Senior Professor:** G. J. Mann; **Professor:** R. Herrmann; **Commanders/Lieutenant Colonels:** E. A. Short, W. F. Cross, J. F. Foster, J. J. MacPherson, C. D. Roberts, Jr., (USMC), G. I. Thompson, J. F. Donovan, A. M. Potter, Jr., C. O. Anderson, W. C. Uelman, D. D. Beal (USMC); **Associate Professors:** J. Williams, R. F. Powell, E. D. Traganza, C. N. G. Hendrix; **Lieutenant Commanders/Majors:** R. R. McArthur, L. B. Greene, H. I. Winter, E. E. Inman, "S" P. Halle, III, A. Morano, D. A. McGuiness, S. R. Golanka, J. D. Mackenzie, J. J. Higginson, G. J. Ertlmeier (USMC), J. F. Keith, J. C. Rydzewski, J. G. Vaiana, L. H. Fisler, M. A. Atwell, "J" P. London, M. G. O'Connor, II, R. D. Kelley, J. F. Neish; **Assistant Professors:** N. L. Tate, R. C. Boys, G. B. Hannah, R. S. Kilcourse, C. T. Latimer, K. Monitor; **Lieutenants/Captains:** D. E. Lebbby, D. W. Lamott, J. H. Reed, W. J. Bakula, Jr., Gerald A. Nelson, J. B. Tupaz, J. A. Cooper, R. E. Gasser, J. Tranchini, C. E. Harris, Jr., D. R. Wheeler, S. J. Bailey, L. D. McCullough, J. B. Sharp, Jr., W. J. Rodriguez, R. F. DeWalt, R. T. Isaacson, T. M. McNicholas, Jr., R. L. Farnan, R. A. Garrett, D. T. Coffee, J. E. Barker, T. C. Grzymala, Geoffrey A. Nelson, J. C. Maheu, P. M. Tansey, C. W. J. Stanat (USMC), F. P. Roll, C. L. Harkness (USMC), M. T. Corgan, M. J. Hart, J. A. Maxwell, P. A. Browne, N. R. Blinn; **Lieutenants (j-g):** H. P. Graham, T. L. Sopwith, R. S. Bell, R. F. Weir, W. T. Rayder, P. E. Porter, R. G. Porter, R. P. Zimmermann, J. H. Minan.

## MISSION

The mission of the Naval Science Department is to provide midshipmen with the fundamental concepts and principles of naval science and with the professional naval knowledge necessary to establish a sound basis for future growth as naval officers. Academic studies encompass leadership and management, meteorology and oceanography, navigation, naval operations and operations analysis, and seapower.

Practical applications of all aspects of shipboard operations including leadership, seamanship, shiphandling, communications, and shipboard organization are presented throughout the four years both in the classrooms and afloat on board the Academy's yard patrol craft. The midshipman is thus developed professionally for service as a career naval officer through both classroom study and practical experience.

## FACILITIES

The Naval Science Department is located in Luce Hall, named for Rear Admiral Stephen B. Luce, founder and first President of the Naval War College. In addition to classrooms, Luce Hall contains a large Navigation Plotting Room, a Planetarium, four fully equipped Combat Information Center (CIC) Training Rooms, and a new Environmental Science Laboratory. The Plotting Room seats 500 at plotting desks for navigation practical work and for examinations.

The Environmental Science Laboratory, established during the 1967 spring semester, is used in support of the oceanography major and minor programs. Additionally, one of the Academy's yard patrol craft has been instrumented for use in obtaining oceanographic data.

The Planetarium is used in teaching astronomy, aerospace environment, and celestial navigation. With the Spitz A-3-P Projector and associated auxiliary projectors, it is possible to simulate the sky as it would appear from any point on earth, at any time of day or night. The complete sequence of events leading to the determination of position at sea by use of the stars, sun, moon, and planets can be portrayed with this device.

During the winter months, instruction in tactical doctrine and procedures is carried out in the CIC Training Rooms. Advanced tactical procedures in anti-submarine and anti-air-warfare situations are covered. Full-scale fleet tactical exercises, simulated in the CIC's to evoke command decisions, include voice radio communications, radar presentations, air raids, and tactical plots.

Instruction in shipboard operations and evolutions is conducted on board the Academy's yard patrol craft, commonly called YP's. These 80-foot diesel-powered ships are exceptionally well equipped to provide training and instruction in seamanship, navigation, communications, and tactics. As plebes, the midshipmen perform the functions of helmsman, lookout, signalman, and telephone talker. During Second Class Summer the midshipmen again have the opportunity to polish their classroom knowledge with a four-week period aboard the YP's. Midshipmen participate in increasingly complex evolutions aboard the YP's during Second Class and First Class Years. A final advanced exercise, headed by First Classmen in command and control positions, completes the afloat training program.

## CORE COURSES

N105	Air-Ocean Environment	N318	Naval Operations Analysis
N106	Introduction to Psychology and Leadership	N409	Leadership and Military Law
N208	Navigation I	N415	Operations and Tactics II
N311	Operations and Tactics I	N416	Operations and Tactics III
N313	Navigation II		

## MINORS PROGRAM

### Management

N609	Psychology: Individual Differences	<i>Plus one of the following:</i>	
N610	Principles of Management	N805	Military Psychology
N701	Financial Management	N822	Advanced Studies in Management
N702	Material Management	H841	The Economics of Defense
N813	Personnel Administration		

### Oceanography

N603	Oceanography	N708	Synoptic Meteorology
N607	Meteorology	N821	Nearshore Oceanography
N705	Ocean Waves, Tides, and Ice	N832	Oceanographic Applications

### Operations Analysis

M601	Matrix Theory	<i>Plus two of the following:</i>	
M606	Probability and Statistics	M671	Linear Programming
N823	Methods of Operations Analysis	N707	Games of Strategy
		N710	Decision Theory
N824	Applications of Operations Analysis	N714	War Gaming
		N808	Naval Strategy and Military Planning

## MAJORS PROGRAM

### Management

Completion of the six-course Management minor is required plus six additional courses as follow:

*Two of the following:*

W707	Digital Computers
N805	Military Psychology*

*One of the following:*

M601	Matrix Theory
M606	Probability and Statistics



N822	Advanced Studies in Management*	H751	Economic Statistics
N902	Research Project	<i>Two of the following:</i>	
or		H752	Econometrics
N903		H841	The Economics of Defense*
<i>One of the following:</i>		H845	Public Finance
M770	Introduction to Mathematical Economics	H846	Economics of Labor Relations
N710	Decision Theory	H848	Money and Banking
H753	Price Determination and Decision Making	H840	Elements of Law

\* May be taken in the major program if not taken to satisfy the minor program.

### Oceanography

Completion of the six-course Oceanography minor is required plus six additional courses as follows:

<i>One of the following combinations:</i>		<i>One of the following combinations:</i>	
S609-S610	General Biology I and II	S721	Theoretical Physics I
S611-S612	General Geology I and II	S722	Theoretical Physics II
<i>Two of the following:</i>			or
M601	Matrix Theory	S733	Physical Chemistry I
M608	Vector Analysis	S734	Physical Chemistry II
M751	Engineering Mathematics I		or
M752	Engineering Mathematics II	S704	Principles of Underwater Acoustics
M721	Advanced Calculus I	S705	Sonar
M722	Advanced Calculus II		

### Operations Analysis

Completion of the six-course Operations Analysis minor is required plus six of the following additional courses:

M671	Linear Programming*	N808	Naval Strategy and Military Planning*
N707	Games of Strategy*		
N710	Decision Theory*	H841	Advanced Economics and Problems of Defense Planning
N714	War Gaming*		
M770	Mathematical Economics	N902	Research Project

\* May be taken in the major program if not taken to satisfy the minor program.



*Main Corridor, Luce Hall, and Combat Information Center*







## Course Descriptions

**N105 AIR-OCEAN ENVIRONMENT.** *Three Sem Hrs (3-0).* Designed to familiarize the prospective naval officer with the impact of the marine environment upon naval operations. The subject is approached from a viewpoint that integrates the hydrosphere-atmosphere as a system. Basic physical and hydrodynamic laws are presented, as applicable, to topics which include waves, tides, currents, temperature structure, chemical and biological aspects, and bottom topography of the oceans, and winds, synoptic weather, and violent storms of the atmosphere. Environmental effects upon navigation, sound and radar propagation, man-in-the-sea, and survival are typical of implications to operating personnel and equipment which are stressed throughout the course.

**N106 INTRODUCTION TO PSYCHOLOGY AND LEADERSHIP.** *Three Sem Hrs (3-0).* Instruction in the fundamental principles of psychology and human behavior with emphasis on the relevance of these principles to the practices of naval leadership. Instruction in the basic principles of management and organization with discussion of the procedures and techniques of applying human-relations principles to naval management.

**N208 NAVIGATION I.** *Four Sem Hrs (3-2).* This first course in navigation provides an introduction to the materials and equipment, techniques, and procedures involved in safe marine navigation. The topical coverage begins with a study of the geographic coordinate system and with the theory of the more commonly used chart projections. The student is introduced to basic principles of piloting, both visual and radar, and to navigational aids and chart symbolism. As he progresses, rules of the nautical road, the maneuvering board, and elementary naval tactics are integrated into the navigation picture. Rudimentary theory of current and prospective fleet electronic navigation systems is also introduced. The student gains proficiency in the navigational techniques through application of classroom learning during weekly two-hour laboratory problem periods. *Prereq: 3/C at-sea training.*

**N311 OPERATIONS AND TACTICS I.** *Three Sem Hrs (2-2).* An introduction to naval communications and surface-ship operations in the classroom followed by practical instruction in shiphandling, basic formation maneuvers, and tactical communications drills during planned at-sea exercises on board yard patrol craft (YP's). This course is designed to provide midshipmen with the initial foundation of knowledge and experience required of the officer of the deck at sea. *Prereq: N208.*

**N313 NAVIGATION II.** *Three Sem Hrs (2-2).* Designed to develop theoretical knowledge and practical skills in celestial navigation. Topical coverage proceeds from an introduction to the navigation universe and the development of required coordinate systems, through an investigation of navigational time and the solution of the navigational triangle, to the subsequent determination of geographical position. Sextant theory and corrections to observations are treated. Advanced rules of the nautical road, and maneuvering board and tactical maneuvering subjects are interspersed throughout the course. Weekly two-hour laboratory problem periods are used to reinforce classroom subject material through practical application. *Prereq: N311.*

**N318 NAVAL OPERATIONS ANALYSIS.** *Four Sem Hrs (3-2).* The application of operations analysis techniques to the solution of naval warfare problems. Emphasis is placed on providing the decision-maker with a quantitative evaluation of the alternative courses of action which may accomplish a given mission. Specific operational problems are studied in the employment of naval air, surface, and subsurface forces. Analytical techniques applicable to these problems are investigated through study of the basic principles of game theory, detection theory, radar detection theory, search theory, reliability of electronic equipment, and the physics of underwater sound. Utilization of these techniques is related to the evolution of some of the basic tactics described in current naval operational publications. In the laboratory portion of the course, half the time is devoted to controlled exercises in CIC mock-up demonstration rooms. The Combat Information Center and its associated publications and equipment are utilized for collection, display, evaluation, and dissemination of information on air, surface, and subsurface targets. The remaining laboratory hours are spent on board the yard patrol craft (YP's) for familiarization with combined afloat operations and coordination between CIC and the Conn. *Prereq: M309 or M311.*

**N409 LEADERSHIP AND MILITARY LAW.** *Three Sem Hrs (3-0).* Covers those aspects of military justic and international law which are of most use and importance to a junior officer. Group discussion and case study methods are used to analyze current leadership and management situations with emphasis on self-development and individual responsibility. *Prereq: N106 and 1/C at-sea training.*

**N415 OPERATIONS AND TACTICS II.** *One Sem Hr (0-2).* Employment of operational procedures while conducting multi-ship maneuvers in various formations aboard the yard patrol craft (YP's). Tasks performed are those generally required of junior officers on board surface units in the Fleet. Additionally, the midshipman is introduced to the organization of the Department of Defense and the Navy Department, and the allocation of their responsibilities within the national defense structure. *Prereq: N313 and N318.*

**N416 OPERATIONS AND TACTICS III.** *One Sem Hr (0-2).* Requires the midshipman to perform tasks generally required of junior officers at sea while conducting progressively complex multi-ship maneuvers in various advanced formations. A continuation of N415. *Prereq: N415.*

**N603 GENERAL OCEANOGRAPHY.** *Three Sem Hrs (3-0).* A combination of scientific principles, methods, and the body of knowledge unique to oceanography. Encompasses a study of the interaction of internal and external processes which determine the nature of the ocean environment. Beginning with an introduction to the theory of distribution of variables in the sea, the course then deals with processes which (1) act on the bottom of the ocean, (2) determine the composition and properties of sea water, (3) are involved in energy transfer, (4) are associated with the equation of state, salt/heat transfer, continuity and motion, (5) which contribute to the theory of ocean currents and water masses, and (6) explain the cycle of life in the sea. Concludes with a review of regional oceanography and a final emphasis on interdisciplinary analysis of the ocean system. *Prereq: N105, M120 or M152, S102.*

**N607 GENERAL METEOROLOGY.** *Three Sem Hrs (3-0).* Designed to apply the student's basic skills in the classical disciplines to the mechanisms and

processes of the atmosphere. A detailed study of the composition of the atmosphere, weather elements, and instruments and observations initiates the course. Other topics include physics of the atmospheric variables, solar and terrestrial radiation, heat budget of the earth and atmosphere, thermodynamics of dry and moist air, condensation and precipitation processes, the equations of motion in the atmosphere, including the application of the concepts of divergence and vorticity, and the structure of air masses. The dynamics of fronts, pressure systems, and tropical storms are investigated. *Prereq: N105, M120 or M152.*

**N609 PSYCHOLOGY: INDIVIDUAL DIFFERENCES.** *Three Sem Hrs (3-0).* A study of the sources, measurement, and utilization of individual differences. Building upon the general universality of the principles of psychology studied in basic psychology, this course examines the interaction of the physiological, social, cognitive, and situational factors that make each man a unique person. In addition to a more comprehensive study of the areas covered in the basic curriculum, emphasis is placed upon measurement and statistics, testing, adjustments, attitudes, group dynamics, and the physiological basis of behavior. *Prereq: N106.*

**N610 PRINCIPLES OF MANAGEMENT.** *Three Sem Hrs (3-0).* The essential principles of management are presented around the concept that management is a process applicable in many enterprises, including the military. Included, with military applications, are the topics of case study analysis, human relations, functions of management (planning, organizing, directing, coordinating, and control), supervision, and evaluation. *Prereq: N106.*

**N701 FINANCIAL MANAGEMENT.** *Three Sem Hrs (3-0).* An introductory course in the basic fundamentals of accounting concepts. Attention is focused on the principles which underlie the construction of financial statements and their use in management control and business decisions. Concludes with a survey of the generation of the federal budget and the federal accounting process. The role of the military executive as a financial manager is emphasized throughout. *Prereq: N610.*

**N702 MATERIAL MANAGEMENT.** *Three Sem Hrs (3-0).* An introductory course into the various areas of material management. Emphasis is given to concepts of requirements, determination, procurement and contract administration, maintenance programs, and inventory control. Study is also made of the organization and the functions of those activities of the Department of Defense in the material management field. The role of the line officer in effective material management is stressed throughout. *Prereq: N610.*

**N705 OCEAN WAVES, TIDES, AND ICE.** *Three Sem Hrs (3-0).* Study and comparison of classical water wave theory with the modern statistical approach to waves. Relationships between wind and sea-surface phenomena: swell, breakers, internal waves, astronomic tides, tidal currents, seiches, meteorologic tides, and tsunami are examined along with the formation, melting, and movement of ice. *Prereq: N603, N607, S212.*

**N707 GAMES OF STRATEGY.** *Three Sem Hrs (3-0).* A study of mathematical structure and the significance of game theory with emphasis on the solution of two-person zero-sum games. The application of utility theory and various



decision criteria to the selection of alternative strategies in a conflict situation is studied in detail. The minimax theorem and its implications are studied in depth. The simplex method of linear programming is presented as the primary method to solve multiple strategy games. Course is taught in the framework of military applications. *Prereq: M601.*

N708 SYNOPTIC METEOROLOGY. *Three Sem Hrs (3-0).* Particular emphasis is placed on the scientific method of analysis and on prognostication of the synoptic features of the atmosphere. Topics include the methods and mathematical basis for meteorological analysis, the mechanisms of long planetary and short atmospheric upper-level waves and their associated surface weather systems, and the weather-typing of cyclones, anticyclones and tropical storms. The course culminates in the generation of forecasts of the normal meteorological parameters through the use of dynamical and statistical methods. These forecasts are used to develop predictions of radio and radar propagation characteristics, radiological fallout patterns, vapor trail formation, etc. *Prereq: N607, M309.*

N710 DECISION THEORY. *Three Sem Hrs (3-0).* A mathematical study of the decision-making process through the application of probability and descriptive statistics. Emphasis is placed on the quantitative implications of uncertainty. Areas of concentration include Bayes strategies, hypothesis testing, and utility theory. The techniques of decision theory are applied to naval operational planning and military decision-making. *Prereq: M606.*

N712 AEROSPACE ENVIRONMENT. *Three Sem Hrs (3-0).* Designed to give the student a better understanding of the universe around him as well as his relationship to it, and to develop his interest in interplanetary navigation, space travel, space and solar physics, astrobiology, astrogeology, and the factors making up space medicine. *Prereq: S212.*

N714 WAR GAMING. *Three Sem Hrs (2-2).* An introduction to the use of war gaming both as a training device and as an analytical technique for the treatment of complex operational problems. Topics include historical development, classification of war games by type and manual war gaming, computer-assisted war gaming, the scientific method and simulation, the Monte Carlo Method, principles of computer simulation design, and war gaming activities of the Armed Forces. Laboratory periods are devoted to the play of several manual war games and to a class project in the design of a computer simulation. Computer programming is *not* a prerequisite, although there is opportunity for those who are interested to program a computer simulation. Several field trips are planned to war gaming organizations in the area. *Prereq: M120.*

N805 MILITARY PSYCHOLOGY. *Three Sem Hrs (3-0).* An introduction to the dynamics of task-oriented groups. Such factors as group structure, interpersonal relationships and leadership style as they relate to organizational effectiveness in the military, formation of attitudes and techniques for attitude change, individual behavior in social systems, group cohesiveness, and effect of deviant behavior on group problem-solving will be studied in detail. *Prereq: N609.*

N806 ADVANCED NAVIGATION. *Three Sem Hrs (3-0).* A study and assessment of the art and science of navigation—past, present, and future. The course



**Planetarium**

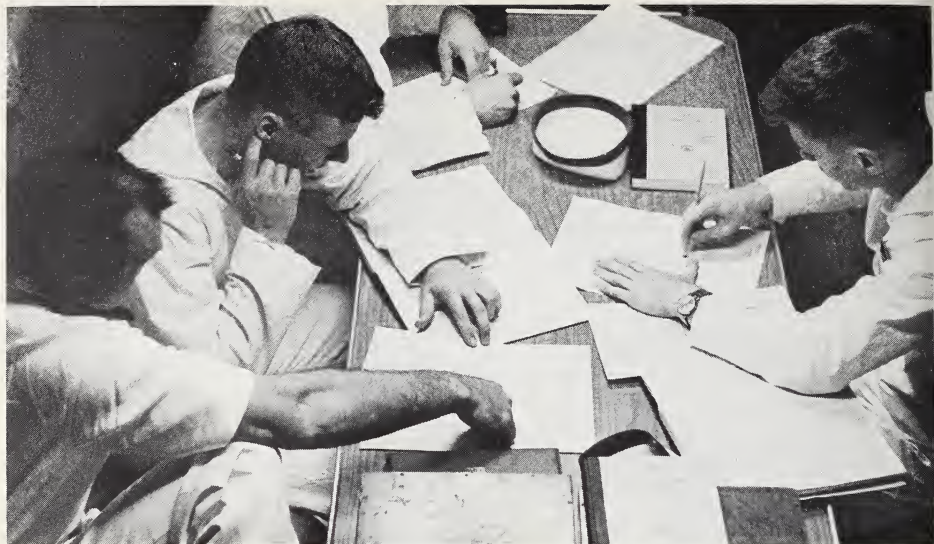
includes a survey of the history of navigation, an examination of the special problems of polar and lifeboat navigation, a study of the theory and operation of the most recent electronic, satellite, and inertial navigation systems, and an introduction to space navigation. *Prereq: N313.*

**N808 NAVAL STRATEGY AND MILITARY PLANNING.** *Three Sem Hrs (3-0).* The interrelationship of naval strategy, national strategy, and national policy to current international situations and commitments. The strategic effect of naval operations, naval force levels, and economic and ecological factors affecting the employment of naval power are investigated. Detailed studies are made of the military planning process, the intelligence process, and national and naval estimates. *Prereq: For 1/C or 2/C only.*

**N813 PERSONNEL ADMINISTRATION.** *Three Sem Hrs (3-0).* Concerned with the broad areas of personnel management. Recruitment, selection, placement, training, promotion, and evaluation are covered by comparing civilian industrial organizational practices in these areas with military practices. Emphasis is focused on the topics most directly applicable to the military profession. *Prereq: N609, N610.*

**N821 NEARSHORE OCEANOGRAPHY.** *Three Sem Hrs (3-0).* Examines the oceanographic regime from the continental break to the intertidal zone. A critical look is taken at the forces at work during the transformation of wave energy in shoaling waters. Refraction diagrams are completed by different methods in conjunction with breaker and surf forecasts. Beach and beach sediments, coastlines and shelf areas are discussed with reference to origin, classification, and features along with the associated biomass. Functional beach structures, case studies, and naval applications complete the nearshore topics discussed. *Prereq: N603, N705.*

**N822 ADVANCED STUDIES IN MANAGEMENT.** *Three Sem Hrs (3-0).* An analysis in depth of actual problems confronting commercial and military organizations in the field of management, with emphasis on the utilization and



*Navigation instruction aboard yard patrol craft*

application of the principles and techniques developed in the basic curriculum. Effort is directed toward identifying the problem, developing alternative courses of action, and determining recommended solutions. *Prereq: N701, N702, N813.*

**N823 METHODS OF OPERATIONS ANALYSIS.** *Three Sem Hrs (3-0).* A study of the concepts, technical terms, and tasks of operations analysis; the organization of investigations; and the collection and evaluation of data. Study is made of the techniques and typical problems in operations analysis: linear and dynamic programming, queuing theory, sequential analysis, networks, allocation problems, and inventory problems. Examples are taken from naval applications. *Prereq: M601, M606, N318.*

**N824 APPLICATIONS OF OPERATIONS ANALYSIS.** *Three Sem Hrs (3-0).* Presentation of a selection of reports from current literature, primarily in the naval warfare areas. Illustrations of the methodologies of operations analysis are studied in greater detail. These studies include problems in the areas of antisubmarine warfare, anti-air warfare, strike operations, mine warfare and logistics. *Prereq: N823.*

**N832 OCEANOGRAPHIC APPLICATIONS.** *Four Sem Hrs (3-2).* Application of the sciences of oceanography and meteorology to the many facets of navel planning, operations, and research and development. Topics include weather, surf, waves, ice, optimum ship routing, ASWEPS, and submarine, antisubmarine and amphibious operations. Work aboard an 84-foot oceanographic research vessel, YP-654-OR, and in the Environmental Science Laboratory and Data Center supports classroom lectures. Operations afloat involve surveys utilizing basic and advanced oceanographic instrumentation in data collection and observations. *Prereq: N821.*

**N902-903 RESEARCH PROJECT.** *Three Sem Hrs (3-0, 3-0).* An independent study and research project under the guidance of a faculty adviser in an area of interest to the student in his major field. If the project is of sufficient magnitude and depth, it may be continued beyond one semester. *Prereq: Approval of the Head of Department.*



## SCIENCE DEPARTMENT

**Head of Department:** Captain W. C. Kistler; **Executive Officer:** Commander J. J. Thompson; **Senior Professor:** E. J. Cook; **Professors:** R. A. Goodwin, J. L. Daley, H. H. Baker, Jr., E. R. Pinkston, G. E. Leydorf, J. A. Lee, Jr., J. R. Smithson, J. F. Kelley, Jr., H. F. Maling, Jr., W. M. Smedley, G. D. Gutsche, R. E. Alley, Jr., D. G. Sheets, O. W. Rollins, S. P. Massie, J. R. Wiebush, S. A. Elder; **Commanders/Lieutenant Colonels:** J. A. Bortner, G. H. Roby, R. W. Reed, F. M. Hollick, J. D. Shoup (USMC), E. E. Shoults (USMC), D. R. Hendrick, F. T. Woodall, Jr., W. Griffith, L. R. Patterson, J. C. Patrick, W. R. Overdorff; **Associate Professors:** W. D. Pennington, C. A. Fowler, III, M. M. Oldham, R. R. Reesler, J. G. Zimmerman, W. K. Kay, J. H. Klein, L. R. Schweizer, J. C. Thompson, E. D. Hall, D. A. Nordling, D. L. Hathway, H. M. Neustadt, Jr., F. J. Gomba, B. H. Morgan, B. J. Graham, R. R. Corey, Jr., V. Acosta, J. R. Nixon, C. W. Rector, G. P. Calame, W. F. O'Hara, F. L. Miller, S. E. Krikorian, Jr., E. Koubek; **Lieutenant Commanders/Majors:** J. F. Kropf, R. P. Inman, F. M. Fleeman, V. G. Nomady, P. S. Blair, L. E. Pellock, E. A. Sechrest, P. B. Friedrichs (USMC), P. C. McKinnon, E. O. Dailey, J. R. Camper, G. J. Jenkins, Jr., **Assistant Professors:** R. L. Johnston, F. J. Eberhardt, D. W. Brill, J. V. Prestia, W. E. Fasnacht, O. L. Jones, S. H. Burns, R. P. Santoro, R. N. Shelby, D. J. Treacy, J. D. Hollabaugh, F. P. Kuhl, Jr.; **Lieutenants/Captains:** J. F. Mayhew (USAF), R. O. Meyers, G. J. Hopkins, M. D. Duffy, C. R. Thomas, J. W. Mader, E. P. Feist, R. R. Loose, A. F. Vierling, T. A. Shepherd, R. C. Baker, M. D. P. Groves, D. H. Loescher, H. F. Russell, W. A. Mason, Jr., J. L. Macon, C. A. Rapp, T. D. Mathews, G. S. Anderson, R. A. Bowman, R. S. Dalzell, T. P. Smith, D. S. McCaffrey, Jr., E. A. DeMeo, F. P. Box; **Instructor:** J. F. Hollywood, Jr.; **Lieutenants (j-g):** J. P. Segerstrom, F. C. Williams, W. G. Warner; **Ensign:** M. G. Deverell.

## MISSION

The mission of the Science Department is to impart basic concepts and theories, together with appropriate applications, of the physical, life, and earth sciences. A study of science fundamentals is pursued throughout the curriculum. While a familiarity with present-day devices is a necessity, even more important is an understanding of the fundamental principles to which past, present, and future devices owe, or will owe, their existence. Midshipmen are given a realization that progress depends upon a mastery of basic truths and that, as naval officers, they are being prepared to direct the development and use not only of the accomplished results of the sciences but of future possibilities.

Excellent laboratory facilities are provided for student course work and research in chemistry, physics, biology, and electrical and

electronics engineering. Most courses require midshipmen to participate in a minimum of 2 hours of laboratory work each week. Classroom instruction is also supplemented by periodic demonstration lectures and testing. In addition to the 7 core courses required of all midshipmen, the department offers 74 electives.

## FACILITIES

### Electrical Science

The electrical science laboratories employ a unique concept which involves a central distribution center and a custom-designed work table. Voltage signals of varied frequency and waveforms are produced in an extensive array of electronic generators located in the distribution center. These signals are relayed through coaxial cables to all of the laboratories on a selective basis. Cable runs are also provided to make this wide selection of waveforms available in lecture rooms, classrooms, computer facilities, and selected laboratories of other Science Department disciplines. Primary electrical power (60 Hz a-c, 400 Hz a-c, and d-c) is distributed from the central distribution center through appropriate switching and protective facilities.

Each laboratory table provides a large work area located immediately in front of a metal housing designed to accommodate eight standard 19-inch panels. Electrical services are supplied to the table through two of these panels. One provides safe and convenient access to primary power, and the other is used for voltage signals of varied frequency and waveform. The second panel also contains provisions for impedance transformation and amplitude adjustment. The remaining panels make instruments and other support facilities available. The array of panels installed at a particular work table is dictated by the nature of the experiment and the academic level of the student. Typical instrumentation, available in panel-mounted form, includes multimeters, vacuum tube voltmeters, power supplies, bridge and potentiometer circuits, utility primary power panels, digital circuit breadboards, etc. Additional panels will be designed and fabricated as technological requirements dictate. Experimental work is carried out on experimental circuit boards which are designed to facilitate rapid connection and permutation of circuits and convenient measurement of quantities of interest.

The laboratory table is designed to provide discipline-oriented



facilities for a two-man student team. Also available at each work station is a binaural audio link that supplies two pairs of binaural headphones with magnetic tape programs. These programs can be synchronized to slides or other teaching aid material if desired. The tape and synchronization facilities are components of the central distribution system.

### Physics

Teaching facilities for the physics curriculum utilize three basic types of spaces: classrooms, lecture halls, and laboratories. Physics classrooms provide a total seating capacity for 510 students in 17 rooms. Each classroom is designed for the use of all the modern audio-visual aids such as television, overhead projection, movies, and slides. The primary physics lecture room of 240 seats is also designed to provide effective use of all audio-visual aids as well as a large rear screen projection system.

There are 18 physics laboratories with a total floor area of approximately 16,000 square feet. Facilities are provided for laboratory courses in general physics, mechanics, acoustics, optics, and atomic and nuclear physics. Also included in the physics laboratory area are five faculty research compartments and a laboratory with multiple independent student research stations. Equipment available for both teaching and research includes such items as an anechoic chamber, a vacuum spectrograph, and an electron



paramagnetic resonance apparatus.

Physics support facilities include a large conference room, a precision machine shop, two darkrooms, and an equipment development and repair shop.

### Chemistry

Eight laboratories, arranged in pairs and with a balance room for each pair, are provided for general chemistry instruction. Each laboratory has 20 work stations, and each balance room is equipped with single-pan balances, top-loading balances, student model pH meters, visible-range spectrophotometers, and a high-temperature oven. Laboratories are serviced from a large central stock and preparation room. Each work space has cold water, gas, 110-volt a-c power, and variable a-c power available. Hot water and distilled water are available in each room.

Two organic chemistry laboratories (each with 16 work spaces and 32 student storage facilities), one analytical laboratory (16 work spaces and 32 student storage facilities), one physical chemistry laboratory, and one radiochemistry laboratory are available. Except for the radiochemistry laboratory, preparation rooms adjoin each of the laboratories. Services available in each laboratory include a-c power, variable d-c power, air, gas, vacuum, steam, cold water, hot water, and distilled water.

The biology laboratory accommodates 24 students and is adjoined by a preparation room. There are seven research laboratories. Services are similar to those available in the organic chemistry laboratories.

There are two instrument rooms, one designed for the use of students in organic, analytical, and physical chemistry and the other for the support of student and faculty research. The following special instruments are available for chemistry laboratory work and for faculty and student research: spectrophotometers (IR, visible, and UV), electrobalance (microbalance), recording polarograph, polaratron, flame photometers (filter and grating types), atomic-absorption instrument (digital concentration readout), X-ray emission/diffraction instrument, high-resolution NMR, gas chromatographs (thermal conductivity and flame-ionization detectors), analyzers (carbon, hydrogen, and nitrogen), recording pH stat, amperometric titrator, conductometric-titration apparatus, mass spectrometer, high-pressure hydrogenator, constant-temperature baths (some refrigerated), research model pH meter, micro-calorimeter, and ovens and similar service equipment.

## CORE COURSES

S101	General Chemistry I	S206	Modern Physics
S102	General Chemistry II	S305	Introduction to Electrical Science
S211	General Physics I		
S212	General Physics II	S306	Applications of Electrical Science

## MINORS PROGRAM

### Applied Science

*Core substitutions as follows:*

S213	Introductory Physics I (in lieu of S211)
S214	Introductory Physics II (in lieu of S212)
S620	Electrical Circuit Principles (in lieu of S305)
S740	Introduction to Active Circuits (in lieu of S306)

*Plus:*

S701	Atomic Physics
S702	Nuclear Physics
S741	Electronics
M751	Engineering Math I
M752	Engineering Math II
E708	Heat Transfer

### Electrical Science

*Core substitutions as follows:*

S213	Introductory Physics I (in lieu of S211)
S214	Introductory Physics II (in lieu of S212)
S620	Electrical Circuit Principles (in lieu of S305)
S740	Introduction to Active Circuits (in lieu of S306)

*Plus:*

S741	Electronics
S821	Theoretical Physics III
S842	Electrical Properties of Materials
S843	Digital Techniques
W332	Linear Systems Analysis

*Plus one of the following:*

S701, S704, S710, S840, S841, S844, S850, S851, M601, M606, M704, M721, M751, W351, W931

### Physics

*Core substitutions as follows:*

S213	Introductory Physics I (in lieu of S211)
S214	Introductory Physics II (in lieu of S212)

*Plus:*

S701	Atomic Physics
S722	Theoretical Physics II
S821	Theoretical Physics III

*Plus two of the following:*

S702	Nuclear Physics
------	-----------------

S704	Underwater Acoustics
S822	Theoretical Physics IV
S830	Physics of Solids
S832	Statistical Physics

*Plus one of the following:*

S721	Theoretical Physics I
S733	Physical Chemistry I (without lab)
S811	Physical Chemistry I (with lab)

## Chemistry

S605	Organic Chemistry I	S714	Analytical Chemistry I
S606	Organic Chemistry II	S811	Physical Chemistry I
S713	Inorganic Chemistry I	S812	Physical Chemistry II

## MAJORS PROGRAM

### Applied Science

*Core substitutions as follows:*

S213	Introductory Physics I (in lieu of S211)
S214	Introductory Physics II (in lieu of S212)
S620	Electrical Circuit Principles (in lieu of S305)
S740	Introduction to Active Circuits (in lieu of S306)

*Plus:*

S701	Atomic Physics
S702	Nuclear Physics
S741	Electronics
M751	Engineering Math I
M752	Engineering Math II
E708	Heat Transfer
S733	Physical Chemistry I
W332	Linear Systems Analysis

*Plus two of the following:*

E701, M606, S733, S821, S822, S710,  
S830, S840, S841, S842, S843, S844,  
S850, S734, S832, W351, W931, W932

### Electrical Science

*Core substitutions as follows:*

S213	Introductory Physics I (in lieu of S211)
S214	Introductory Physics II (in lieu of S212)
S620	Electrical Circuit Principles (in lieu of S305)
S740	Introduction to Active Circuits (in lieu of S306)

*Plus:*

S741	Electronics
S821	Theoretical Physics III
S840	Network Analysis
S842	Electrical Properties of Materials
S843	Digital Techniques
W332	Linear Systems Analysis
S710	Electromagnetic Waves

*Plus three of the following:*

S701, S704, S705, S841, S844, S850, S851,  
S852, M601, M606, M704, M721, M722,  
M751, M752, M802, M825, M826, M852,  
M861, W351, W931, W932, W934

## Chemistry

S605	Organic Chemistry I	S814	Quantitative Analysis II
S606	Organic Chemistry II	S815	Inorganic Chemistry II
S713	Inorganic Chemistry I		
S714	Analytical Chemistry		
S733	Physical Chemistry I		
S812	Physical Chemistry II	S816	Biochemistry
S813	Qualitative Organic Analysis	S818	Reaction Kinetics
		S820	Electrochemistry

*Plus one of the following:*



## Physics

*Core substitutions as follows:*

S213	Introductory Physics I (in lieu of S211)
S214	Introductory Physics II (in lieu of S212)

*Plus:*

S701	Atomic Physics
S722	Theoretical Physics II
S723	Lab Physics I
S724	Lab Physics II
S821	Theoretical Physics III
S832	Lab Physics III

S824	Lab Physics IV
S825	Physics Seminar I
S826	Physics Seminar II

*Plus two of the following:*

S702, S704, S822, S830, S832

*Plus one of the following:*

S721, S733, S811

*Plus one of the following:*

M721, M751

*Plus one of the following:*

M722, M751, M825

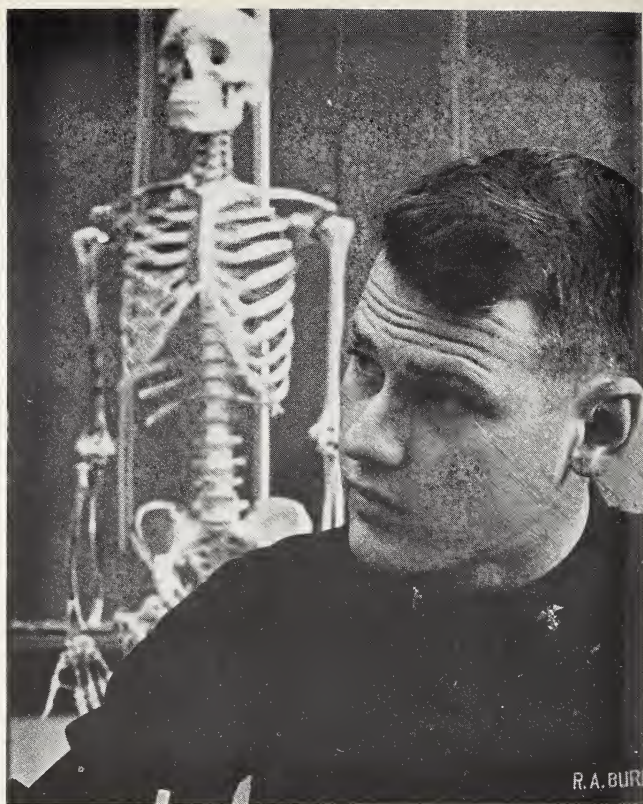
## Course Descriptions

### CHEMISTRY

**S101 & S102 GENERAL CHEMISTRY I AND II.** *Four Sem Hrs Each Term (3-2).* Fundamentals of chemical theory with a study of the properties of metals and nonmetals. Among topics studied in chemical theory are the laws of chemical change, atomic structure and the periodic table, kinetic-molecular theory and the gas laws, solutions, chemical equilibrium, ionization, electrochemistry, radioactivity, nuclear reactions, and nuclear energy from fission and fusion reactions. Metals studied include the alkali and alkaline earth metals, aluminum, and iron. Nonmetals studied are limited to oxygen, hydrogen, halogens, nitrogen, and sulfur families, carbon and simple carbon compounds. Practical naval applications covered include batteries, corrosion, water treatment, explosives, chemical warfare, the atomic bomb, the hydrogen bomb and nuclear power plants for propulsion. Laboratory work includes both descriptive and quantitative experiments, and a brief introduction to the principles of semimicro qualitative analysis applied to a few of the more common cations.

**S105 & S106 ADVANCED GENERAL CHEMISTRY I AND II.** *Four Sem Hrs Each Term (3-2).* Designed primarily for the advanced student. All the important fundamental concepts of chemistry are discussed but from a much more penetrating point of view. Topics included are elementary thermodynamics, reaction rates, and chemical bond theory.

**S107 GENERAL CHEMISTRY (SPECIAL).** *Three Sem Hrs (3-0).* The important basic principles of chemistry are discussed at a significantly more rapid pace (at a rate of about  $2\frac{1}{2}$  to 1) than in S101 & S102. Special topics emphasized include practical naval applications such as batteries, corrosion, water treatment, explosives, nerve-gas chemistry, fission and fusion weapons, and nuclear power plants. Expanded coverage is given to organic chemistry. Admission to this course is limited to midshipmen who have satisfactorily completed a year of college-



level chemistry but did not validate S101 and S102, and will be authorized only with the specific approval of the Academic Dean. Completion of S107 satisfies the core course requirements of both semesters of S101 & S102.

**S605 & S606 ORGANIC CHEMISTRY.** *Five Sem Hrs Each Term (3-6).* A study of the principles of organic chemistry, including the fundamental concepts of energy relationships, resonance, dipole moments, ionic character in covalent bonds and relative electronegativities of atoms and radicals, and the newer areas of organic chemistry, including, for example, high-energy fuels, synthetic motor fuels, explosives, synthetic rubber and high polymers, detergents, and "wonder" drugs. *Prereq: S102 or S107.*

**S609 & S610 GENERAL BIOLOGY I AND II.** *Four Sem Hrs Each Term (3-2).* A study of the fundamental principles of the various fields of biology, beginning with the characteristics and behavior of protoplasm and cells; general plant and animal histology; plant and animal metabolism; cell gametogenesis and cell division. The principles of genetics and eugenics; ecology; organic evolution. *Prereq: S102 or S107.*

**S611 PHYSICAL GEOLOGY.** *Three Sem Hrs (3-0).* A study of the science of the solid earth, including the nature and properties of the minerals and rocks composing the earth, their distribution, the processes by which they are formed, altered, transported, and distorted, and the nature and development of the landscape. *Prereq: S101 or S107.*

**S612 HISTORICAL GEOLOGY.** *Three Sem Hrs (3-0).* A study of the physical history of the earth and the record of life on the earth. Emphasis on the development of the North American Continent. *Prereq: S101 or S107 (S611 desirable but not required).*

**S713 INORGANIC CHEMISTRY I.** *Three Sem Hrs (3-0).* A study of fundamental concepts of inorganic chemistry. Topics covered include atomic structure, chemical bonding, complex ions and coordination chemistry, and special topics, including organometallics and rare gas compounds. *Prereq: S102 or S107.*

**S174 ANALYTICAL CHEMISTRY I.** *Four Sem Hrs (2-6).* A study of volumetric, gravimetric, and modern optical and electrical methods of analyses. Theory, laboratory procedures, and techniques are stressed. *Prereq: S102 or S107.*

**S733 & S734 PHYSICAL CHEMISTRY I and II.** (Without Lab.) *Three Sem Hrs Each Term (3-0).* An introduction to such topics as physical states of matter, kinetic theory of gases and liquids, the first and second laws of thermodynamics, free energy and spontaneity of chemical reactions, phase equilibrium, properties of solutions, chemical kinetics, electrochemistry, elementary quantum theory, and atomic and molecular structure. *Prereq: S102 or S107; S212, M220.*

**S811 & S812 PHYSICAL CHEMISTRY I AND II.** (With Lab.) *Four Sem Hrs First Term (3-3); Five Sem Hrs Second Term (3-6).* An introduction to such topics as physical states of matter, kinetic theory of gases and liquids, the first and second laws of thermodynamics, free energy and spontaneity of chemical reactions, phase equilibrium, properties of solutions, chemical kinetics, electrochemistry, elementary quantum theory, and atomic and molecular structure. *Prereq: S102 or S107; S212, M220.*

**S813 ORGANIC CHEMISTRY III.** *Four Sem Hrs (2-6).* Synthetic methods and discussion of important theories of organic chemistry—a continuation of S605-606. Methods of qualitative organic analysis are also covered. The laboratory work emphasizes systematic methods for separation and identification of organic compounds. *Prereq: S606.*

**S814 ANALYTICAL CHEMISTRY II.** *Four Sem Hrs (2-6).* A continuation of chemistry S714. The theory and applications of modern instrumental methods of analysis are stressed. *Prereq: S714, S812.*

**S815 INORGANIC CHEMISTRY II.** *Three Sem Hrs (3-0).* Continuation of S713. The following topics are considered: solute-solvent effects, acid-base theories, nonaqueous solvents, crystal structure, kinetics and mechanisms, and special topics, including carbonyl compounds, boron hydrides, isopoly and heteropolymolybdates and tungstates, and items of interest from recent chemical literature. *Prereq: S713.*

**S816 BIOCHEMISTRY.** *Three Sem Hrs (3-0).* An introductory course in human biological chemistry which includes a detailed study of the chemistry of proteins, carbohydrates, and fats, tissue, enzymes, digestion, physiological oxidations, energy metabolism (both normal and abnormal) respiration and acid-base balance water and trace mineral paths. The physiological role of vitamins



Chemistry  
Research Lab



and hormones is considered and chemical analysis of blood, milk and urine are included. Modern radioisotope techniques are discussed. *Prereq: S102 or S107; S605.*

**S818 REACTION KINETICS.** *Three Sem Hrs (3-0).* An examination of the physical and mathematical bases of reaction-rate studies. The mechanisms and statistical mechanics of reactive collisions and the kinetics and mechanisms of chemical reactions are covered. Special emphasis is given to solution and adsorption phenomena, with particular attention to the kinetics of homogeneous and heterogeneous catalysis. *Prereq: S812.*

**S820 ELECTROCHEMISTRY.** *Three Sem Hrs (3-0).* A study of electrolytic conductance, ion migration, electrode potentials, the deposition and corrosion of metals, and electrokinetic phenomena in terms of the physiochemical properties of electrolyte systems. *Prereq: S812.*

**S902C & S903C SCIENCE RESEARCH PROJECT.** *Three Sem Hrs Each Term (0-6, 0-6).* A creative scientific research project in the student's field of interest. A faculty adviser must approve and monitor each project. At least one conference and a minimum of six hours of laboratory work are required each week. If the project is of sufficient magnitude and depth, it may be continued for a second semester. *Prereq: Approval of the Head of Department.*

**S904C & S905C SCIENCE SPECIAL LABORATORY PROJECT.** *Two Sem Hrs Each Term (0-4,0-4).* A creative scientific laboratory project of limited scope in the student's field of interest. A faculty adviser must approve and

monitor each project. A conference and a minimum of four hours of laboratory work are required each week. Individuals pursuing a major research project should enroll in S902C/S903C. *Prereq: Approval of the Head of Department.*

**S906C & S907C SCIENCE SPECIAL LABORATORY PROJECT.** *One Sem Hr Each Term (0-2, 0-2).* Same as S904C/S905C except that a minimum of two hours of laboratory work is required each week.

## PHYSICS

**S206 MODERN PHYSICS.** *Three Sem Hrs (3-0).* A survey of the significant discoveries and developments which have marked the progress of physics during the first half of the 20th century. Some of the topics considered are the Rutherford-Bohr atom; quantum and relativistic effects; the structure of many-electron atoms; particle ranges, absorption, and detection; radioactivity; the neutron; nuclear forces; and nuclear reactions. *Prereq: S212 or S214.*

**S211 & S212 GENERAL PHYSICS I AND II.** *Four Sem Hrs Each Sem (3-2).* Emphasis in these two sequential courses is placed on the fundamental principles of classical physics, however, contemporary applications of these principles are introduced as appropriate. The topics covered are mechanics, electricity, magnetism, kinetic theory, wave motion, sound, and light. The calculus and vectors are used throughout the course. *Prereq: S102 or S107 is required for S211, S211 for S212.*

**S213 & S214 INTRODUCTORY PHYSICS I AND II.** *Four Sem Hrs Each Sem (3-2).* This study in general physics is designed to provide an adequate foundation for those midshipmen who have elected to minor in Physics or Applied Science, for whom it is required as a substitute for core courses S211 and S212, and, also, to offer an enriched course for selected midshipmen who have primary interest in other allied disciplines. The scope is that of the traditional general physics course, including the study of mechanics, heat, sound, electricity, and light. Depth of treatment is somewhat greater than that of the core course, and a different text is used. The calculus and vector notation are employed throughout. *Prereq: S102 or S107; M111; Permission of Head of Science Department for midshipmen not minoring in Physics or Applied Science.*

**S608 DEVELOPMENT OF PHYSICAL THEORY.** *Three Sem Hrs (3-0).* Primarily a nonmathematical survey of the evolution of some basic physical concepts. Considerable use is made of library references, and emphasis is placed upon historical development, influence of philosophy, and considerations of alternate formulations. The whole range of physics will not be covered, but rather a few ideas will be studied in some detail. Examples are the conservation of energy, electric charge, temperature and heat, and formulation of the laws of motion.

**S701 ATOMIC PHYSICS.** *Three Sem Hrs (3-0).* The theory of relativity and the basic theory of quantum mechanics are presented with their application to the theory of fundamental atomic processes. Included are the quantum theory of radiation, atomic structure, the detailed analysis of the one-electron

system, fine structure, addition of angular momenta and multi-electron systems, periodic systems of elements, x-ray phenomena, and molecular spectra. *Prereq: S206.*

**S702 NUCLEAR PHYSICS.** *Three Sem Hrs (3-0).* A study of the basic experimental facts pertaining to those phenomena which are purely nuclear in origin, and their interpretation in terms of contemporary quantum theory to obtain a coherent understanding of the nuclear force problem. Included subjects are basic nuclear properties, interaction of radiation with matter, nuclear instruments, nuclear reactions, nuclear structure, elementary structure, and elementary particles. *Prereq: S701.*

**S704 PRINCIPLES OF UNDERWATER ACOUSTICS.** *Three Sem Hrs (3-0).* A study of the basic principles of acoustics and the application of these principles to underwater sound problems. Topics include oscillations, plane and spherical waves, radiation patterns, reflection coefficients, attenuation, velocity, ray theory, wave theory, scattering, reverberation, fluctuations, echo-ringing and noise. *Prereq: S212 or S214.*

**S705 SONAR.** *Three Sem Hrs (3-0).* A fundamental study of sound propagation in the ocean environment as it relates to the design and operation of sonar. The elements of the sonar equations such as transmission loss, directivity index, etc. Sources of noise and methods of measurement. Long-range sound propagation. *Prereq: S704.*

**S721 THEORETICAL PHYSICS I.** *Three Sem Hrs. (3-0).* Introduction to thermal physics. The first part of a four-part sequence in theoretical physics begins with the definition of temperature and proceeds to the most elementary concepts of statistical mechanics. Thermodynamic is developed from the first two laws through the Maxwell relations. The kinetic theory of gases, including transport phenomena, is studied. *Prereq: S212 or S214.*

**S722 THEORETICAL PHYSICS II.** *Three Sem Hrs (3-0).* Mechanical vibrations and waves. The second part of the sequence in theoretical physics considers, first, a study of mechanical oscillators: damped, driven, linear and non-linear, and coupled. The wave equation is then derived for one-, two-, and three-dimensional systems. Solutions of the wave equation under various boundary conditions and the propagation of waves through material media are studied in some depth. Illustrations are drawn largely from acoustics. The mechanics of Lagrange and of Hamilton are also presented. *Prereq: S212 or S214.*

**S723 LABORATORY PHYSICS I.** *One Sem Hr (0-2).* Laboratory work in this course is devoted to physical measurement techniques and the performance of experiments closely related to the theory being developed in concurrent physics courses. *Prereq: S212 or S214.*

**S724 LABORATORY PHYSICS II.** *One Sem Hr (0-2).* Laboratory work in this course is devoted to physical measurement techniques and the performance of experiments closely related to the theory being developed in concurrent physics courses. *Prereq: S723.*

**S821 THEORETICAL PHYSICS III.** *Three Sem Hrs (3-0).* A course in





*An experiment in the Advanced Physics Lab*

the basic principles of electric and magnetic fields as expressed in vector form. Electrostatic problems are considered first, using Laplace's and Poisson's equations. The vector potential and the displacement current are introduced and Maxwell's equations are formulated. *Prereq: S212 or S214; M224.*

**S822 THEORETICAL PHYSICS IV.** *Three Sem Hrs (3-0).* This course considers the propagation of waves in general but with special emphasis on electromagnetic radiation. Topics such as reflection, refraction, dispersion, interference, diffraction, polarization, scattering, and absorption are studied. *Prereq: S821.*

**S823 LABORATORY PHYSICS III.** *One Sem Hr (0-2).* Laboratory work in this course is devoted to physical measurement techniques and the performance of experiments closely related to the theory being developed in concurrent physics courses. *Prereq: S212 or S214.*

**S824 LABORATORY PHYSICS IV.** *One Sem Hr (0-2).* Laboratory work in this course is devoted to physical measurement techniques and the performance of experiments closely related to the theory being developed in concurrent physics courses. *Prereq: S212 or S214.*

**S825 PHYSICS SEMINAR I.** *One Sem Hr (1-0).* A seminar with topics selected from modern physics. *Prereq: S722.*

**S826 PHYSICS SEMINAR II.** *One Sem Hr (1-0).* A seminar with topics selected from modern physics. *Prereq: S825.*

**S830 PHYSICS OF SOLIDS.** *Three Sem Hrs (3-0).* An introductory course in physics of the solid state. The topics included are crystal structures, thermal properties of solids, dielectric properties of solids, free electron model of metals, band theory of solids, magnetism and magnetic resonance, and semi-conductors. *Prereq: S701.*

**S832 STATISTICAL PHYSICS I.** *Three Sem Hrs (3-0).* Presents the ele-



Would you believe . . . ?

ments of classical and quantum statistical physics and prepares the student for an advanced treatment of the subject. Emphasis is placed on ensemble theory, and the theoretical structure is developed utilizing modern concepts and notation. The course begins with a review of thermodynamics, developing the Carathéodory axiomatic formulation in some detail. Pertinent aspects of probability theory are presented, the concepts of phase space,  $\mu$ -space,  $\gamma$ -space, and ensembles are introduced, and Liouville's theorem proved. A discussion follows of statistical equilibrium and the uniform, microcanonical, canonical, and grand canonical ensembles. The ergodic problem is treated briefly. The quantum statistical density matrix is developed in detail and its use in quantum ensemble theory explicated. The Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics are developed and compared. Classical and quantum partition functions are obtained for the various ensembles—the grand canonical ensemble being particularly emphasized. The important thermodynamic functions are then expressed in terms of the partition function. The remainder of the course is devoted to selected applications. *Prereq: S721 or S733; S701.*

**S902P & S903P SCIENCE RESEARCH PROJECT.** *Three Sem Hrs Each Term (0-6, 0-6).* A creative scientific research project in the student's field of interest. A faculty adviser must approve and monitor each project. At least one conference and a minimum of six hours of laboratory work are required each week. If the project is of sufficient magnitude and depth, it may be continued for a second semester. *Prereq: Approval of the Head of Department.*

**S904P & S905P SCIENCE SPECIAL LABORATORY PROJECT.** *Two Sem Hrs. Each Term (0-4, 0-4).* A creative scientific laboratory project of limited scope in the student's field of interest. A faculty adviser must approve and monitor each project. A conference and a minimum of four hours of laboratory work are required each week. Individuals pursuing a major research project should enroll in S902P/S903P. *Prereq: Approval of Head of Department.*

**S906P & S907P SCIENCE SPECIAL LABORATORY PROJECT.** *One Sem*



*Hr Each Term (0-2, 0-2).* Same as S904P/S905P except that a minimum of two hours of laboratory work is required each week.

## **ELECTRICAL SCIENCE**

**S305 & S306 INTRODUCTION TO ELECTRICAL SCIENCE AND APPLICATIONS OF ELECTRICAL SCIENCE.** *Four Sem Hrs Each Sem (3-2, 3-2).* Fundamental electrical principles, circuit analysis techniques, principles of electromechanical energy conversion and the elements of electronics. Transient and steady-state conditions in electric circuits; d-c and a-c machinery; vacuum and solid-state devices in amplifiers, oscillators, modulators, receivers, and logic circuits. Fundamentals of electrical measurement and data interpretation are stressed in the weekly two-hour laboratory; emphasis is placed on the cathode-ray oscilloscope as a data display device. *Prereq: S211 or S213, M215 or M221.*

**S403 ELECTRONICS I.** *Three Sem Hrs (2-2).* Introduction to electronic circuits utilizing solid-state devices. Course content includes diode and transistor circuits. Treatment sequence is ideal device, ideal circuit, device principles and characteristics, practical circuit. *Prereq: S306.*

**S404 ELECTRONICS II.** *Four Sem Hrs (3-2).* Continuation of S403. Small-signal amplification; tuned-power amplifiers and principles of amplitude modulation, wave-shaping, and basic switching circuits. *Prereq: S403.*

**S620 ELECTRIC CIRCUIT PRINCIPLES.** *Four Sem Hrs (3-2).* Time-domain analysis of R-L-C circuits; energy relationships, natural and forced response to a variety of non-sinusoidal driving functions; derivation and use of phasor and impedance concepts. Steady-state response of lumped-constant circuits. Magnetic circuits and the ideal transformer. Maximum power, superposition, Thevenin and Norton theorems. Pole-zero characteristics and the interpretation of pole-zero constellations. Fundamental measurement skills, with emphasis on the cathode-ray oscilloscope, are stressed in weekly laboratory exercise. *Prereq: S211 or S213; Coreq: M224 or M228.*

**S710 ELECTROMAGNETIC WAVES.** *Three Sem Hrs (3-0).* Proceeds from a study of electric and magnetic fields, in which vector analysis is employed, to a consideration of Maxwell's equations and the radiation of electromagnetic waves. Boundary conditions and the propagation phenomena of reflection, refraction, interference, and diffraction are treated in some detail, and wave guides, transmission lines, and radiating systems are introduced. *Prereq: S821, M224.*

**S740 INTRODUCTION TO ACTIVE CIRCUITS.** *Four Sem Hrs (3-2).* Principles of electro-mechanical energy conversion. Polyphase systems, rotating magnetic fields, synchronous speed, slip. Fundamentals of motor and generator action. Development and use of mathematical models of typical machines. Conduction processes in semiconductor materials. The semi-conductor diode and the transistor. Volt-ampere characteristics of electron devices; graphical analysis. Temperature effects in semiconductors and bias stabilization. Models and equivalent circuits of electronics devices. Amplifier fundamentals, terminal characteristics of amplifiers, frequency response, impedance compati-



bility. Small-signal equivalent circuits; the decibel and other logarithmic systems. *Prereq: S620.*

**S741 ELECTRONICS.** *Four Sem Hrs (3-2).* Untuned and tuned power amplifiers, distortion analysis, feedback, effects of feedback on amplifier terminal characteristics. Principles of modulation (AM, FM, PCM) and demodulation. Frequency multiplication, translation and synthesis. The superheterodyne radio receiver and beat-frequency oscillator. Noise and bandwidth considerations in communications systems. Electronic devices in the switching mode; elements of pulse and digital circuits. *Prereq: S740.*

**S840 NETWORK ANALYSIS.** *Three Sem Hrs (3-0).* The development of mathematical models to represent electrical and mechanical networks. Solutions within the framework of the model. Physical interpretation of the solution and presentation of this interpretation in the most useful form. The study of linear algebra, determinants, and matrices. Network topology, including cut-set and tie-set matrices. Equilibrium equations, two-port networks, application of two-port theory to active networks, with emphasis on the effects of feedback. Use of digital computer facility for solution of the problems emphasized. *Pre- or Coreq: S740.*

**S841 ENERGY CONVERSION.** *Four Sem Hrs (3-2).* Energy storage in singly and multiply excited systems. Magnetic materials and circuits; hysteresis and eddy current effects. The state function concept. Graphical analysis of singly excited systems. Energy balance equations for constant current, for variable current, for constant-flux linkage, and during arbitrary transition. Application of the basic force equations. Analytic study of singly excited systems. Linear electromagnetic systems. Singly and multiply excited reluctance torque machines. Dynamic analysis of electro-mechanical transducers. Statement and formulation of problems for computer solution. Analytical study of the idealized uniform air gap rotating machine based on the winding inductances. Study of electromechanical devices based on energy-balance equations, the basic force equations, and the winding inductances. Methods of electrical energy generation, including electromechanical, magneto-hydrodynamic, and the fuel cell. Laboratory investigation of a generalized machine in various modes of operation. *Prereq: S740.*

**S842 ELECTRONIC PROPERTIES OF MATERIALS.** *Three Sem Hrs (3-0).* Limitation of classical treatment of conduction properties. Introduction to quantum theory. Statistics, Fermi-Dirac systems. Band theory and electronic conduction. Semiconductors. Semiconductor junctions and devices. A brief discussion of dielectrics and magnetics. *Prereq: S206.*

**S843 SWITCHING CIRCUITS.** *Four Sem Hrs (3-2).* Design and application of representative devices and circuits as used in digital electronic systems. Basic design techniques for semiconductor switching circuits. Introduction to logic concepts and terminology; use of these concepts in the study of complex switching circuits and their use in representative systems. Operation of logic and switching units as registers, adders, multipliers, and other functional elements in typical digital systems. *Prereq: S741 or S306.*

**S844 ELECTRONIC INSTRUMENTS AND MEASUREMENT.** *Four Sem Hrs (2-4).* Analysis and design of electronic circuits of control, measurement,



*Electrical Science Lab*

data transmission and processing. Instrument calibration and response. Comparison of methods for measurement and control of voltage, resistance, impedance, and frequency, to include error analysis. Topics included are electronic voltmeters, DC amplifier, pulse-shaping and switching circuits, function generators, oscillators and time-base generators, counting and time-interval measuring circuits, frequency-control, and measurement circuits. *Prereq: S740.*

**S850 DIGITAL APPLICATIONS.** *Four Sem Hrs (2-4).* The study and analysis of an automated digital-data system, including computer, processing devices, and data communication subsystem. *Prereq: S843.*

**S851 COMMUNICATIONS THEORY I.** *Three Sem Hrs (3-0).* Mathematics of signals; time and frequency domain characterization of signals; transmission of signals through linear systems; bandwidth. Principles of modulation and detection; AM, FM, PM transmission lines. *Prereq: S741.*

**S852 COMMUNICATIONS THEORY II.** *Three Sem Hrs (3-0).* Statistical analysis of noise and other random processes. Sampling and quantization of data. Elements of information theory. Digital communication processes. *Prereq: S851.*

**S902E & S903E SCIENCE RESEARCH PROJECT.** *Three Sem Hrs Each Term (0-6, 0-6).* A creative scientific research project in the student's field of interest. A faculty adviser must approve and monitor each project. At least one conference and a minimum of six hours of laboratory work are required each week. If the project is of sufficient magnitude and depth, it may be continued for a second semester. *Prereq: Approval of the Head of Department.*

**S904E & S905E SCIENCE SPECIAL LABORATORY PROJECT.** *Two Sem Hrs Each Term (0-4, 0-4).* A creative scientific laboratory project of limited scope in the student's field of interest. A faculty adviser must approve and monitor each project. A conference and a minimum of four hours of laboratory work are required each week. Individuals pursuing a major research project should enroll in S902E/S903E. *Prereq: Approval of Head of Department.*

**S906E & S907E SCIENCE SPECIAL LABORATORY PROJECT.** *One Sem Hr Each Term (0-2, 0-2).* Same as S904E/S905E except that a minimum of two hours of laboratory work is required each week.

## WEAPONS DEPARTMENT

**Head of Department:** Captain W. K. Doty; **Executive Officer:** Commander G. C. Sup; **Academic Advisor:** Associate Professor J. W. Neil; **Commanders:** M. B. Lechleiter, C. G. Erb, G. T. Allender, W. R. Olson; **Associate Professors:** E. J. Waller; J. F. Hoffman, D. F. Haber, P. Dransfield; **Lieutenant Commanders/Majors:** W. J. Wysocki, S. B. Walker, L. E. Pellock, L. E. McCullough, A. B. Trammell, E. J. Mahon, Jr., K. F. Robinson, A. A. Carretta, W. F. Hardin, D. E. Lebby, R. M. Gulick (USMC), W. J. Tirschfield (USMC), L. A. Bickley (USMC); **Assistant Professor:** C. F. Olsen; **Lieutenants/Captains:** W. J. Haley, J. R. Lund, D. R. May, R. W. Steiner, R. P. Hardison, P. L. McCammon, J. L. Hammer, R. W. Seiler, T. W. Rogers (USMC).

### MISSION

The mission of the Weapons Department is to provide every midshipman with the supplementary engineering background essential to an understanding of the principles that underlie all modern naval weapons systems; to provide a minors program for those midshipmen who show a particular interest in pursuing a broad engineering program in weapons design, usage, and application, which also prepares the participant for graduate study; and to offer a majors program with electives of appropriate breadth and quality to challenge and enhance the academic potential of superior students in the weapons field.

### FACILITIES

**Analog and Systems Simulation Laboratory.** The Analog Laboratory includes fifteen basic partially expanded Electronics Associates precision analog solid state electronic computers, TR-10 and 20 Models; two fully expanded TR-10 Model computers; and one partially expanded TR-48 Model. These units are available for a variety of applications in problem solving, simulation, and research studies. They are mounted on mobile stands to increase their utilization. Auxiliary equipment includes X-Y and time-strip plotters for recording output data from computers.

**Explosives Laboratory.** Laboratory facilities provide for miniaturized studies in explosive processes and effects. Special equipment developed by the Weapons Department provides for rocket thrust stand testing, dispersion test and study, observation and test of explosive blast effects, strength test of explosives using Trauzl



blocks, vacuum cone study, ballistics range testing, metal forming by explosives, and shaped charge study.

**Automatic Control System Laboratory.** Laboratory facilities include special automatic control system study panels developed and manufactured by the Weapons Department technical staff. Recording and measuring devices are available with each panel to support the basic equipments. The panels permit the students to solve a variety of problems related to their studies in weapons control systems.

**Digital Technology Laboratory.** Laboratory facilities provide support for the study of digital computer technology. Equipment includes BiTran Six digital logic devices with ancillary support items and Digilab logic boards.

**Special Laboratories.** Electronic, environmental, ballistic support, and special project laboratories are available for research.

**Classroom Television.** A closed-circuit classroom television installation provides live and taped programs to 12 classrooms. A single studio and two remotely located terminals are available for television programing with two mobile camera units.

### CORE COURSES

W102	Introduction to Naval Engineering and Weapons Systems	W411	Ballistics and Weapons Control
		W413	Weapons Systems Control

### MAJORS-MINORS PROGRAM

#### Systems Engineering (Weapons)

##### *Required Courses*

W211	Introduction to Systems (Weapons)	W432	Systems Design
W312	Principles of Control Systems (Weapons)	S620	Electrical Circuit Principles (In lieu of S305)
W332	Linear Systems Analysis	S740	Introduction to Active Circuits (In lieu of S306)
W351	Analog and Digital Computation	S741	Electronics

##### *Elective Courses*

To achieve a *minor* in Systems Engineering, the student must complete two courses from Elective A and the required courses above. To achieve a *major*,

the student must complete the minor program and a total of three additional course from Electives A and B. Not more than one of the three may be from another department.

#### Elective A

W931 Automatic Control Systems I  
 W932 Automatic Control Systems II  
 W933 Digital Technology  
 W934 Sampled-Data Control Systems  
 W951 Applications of Computer  
       Technology  
 M601 Matrix Theory

#### Elective B

W904 Independent Study/Project  
 M671 Linear Programming  
 M721 Advanced Calculus I  
 M751 Engineering Mathematics I  
 S821 Theoretical Physics III

#### Course Descriptions

**W102 INTRODUCTION TO NAVAL ENGINEERING AND WEAPON SYSTEMS.** *Three Sem Hrs (3-0).* The operation, characteristics, and capabilities of naval engineering and weapons systems are explored along with their interrelation. The general physical and operational characteristics of ship-propulsion systems, surface-ship guns, ASW and SAM systems, auxiliary engineering systems, and damage-control systems are discussed, stressing the capabilities, limitations, and interdependence of the various systems. Laboratory/participation phase follows immediately during summer at-sea training with the Fleet.

**W211 INTRODUCTION TO SYSTEMS (WEAPONS).** *Four Sem Hrs (3-2).* To introduce the student to the naval weapons systems concept and the basic theory involving system components, and to serve as an introduction to more advanced and detailed treatment of courses in the weapons systems sequence. The course includes a study of the warhead triad (fuzing, arming, safety), and launching, propulsion, and control systems, with laboratory instruction in (a) ballistic dispersions, (b) explosive testing, handling, and safety precautions, (c) rocket-thrust determination, and (d) blast and shock effects. *Prereq: M120, S102.*

**W312 PRINCIPLES OF CONTROL SYSTEMS (WEAPONS).** *Four Sem Hrs (3-2).* The generalized weapon control problem and its solution. Kinematics of weapons station, target, and projectile motions. Prediction angle. Instrumentation necessary to obtain data. Functional classification of fire control systems. Computers in fire control systems. Concepts and problems of inertial guidance and control. *Prereq: M305, S620.*

**W332 LINEAR SYSTEMS ANALYSIS.** *Three Sem Hrs (3-0).* An introductory course in the techniques of analysis of linear physical systems as found in the various engineering disciplines. Topics covered include formulation of the mathematical model of the physical system, analogous systems, Fourier and Laplace transform analysis, transient and frequency response techniques, systems with feedback, and systems with distributed parameters. *Prereq: M220.*

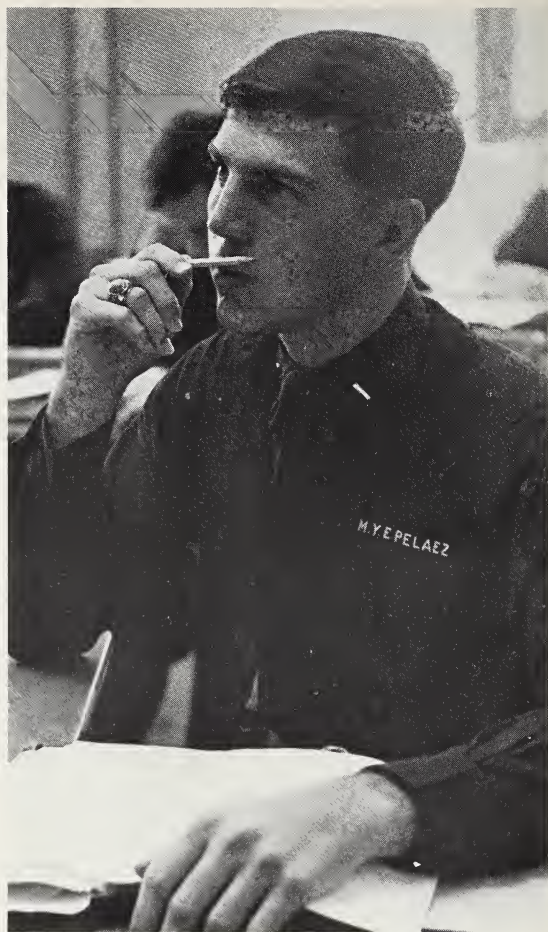


Weapons  
Simulation  
Lab

**W351 ANALOG AND DIGITAL COMPUTATION.** *Three Sem Hrs (3-0).* A study of the solution of general engineering and applied problems on modern electronic digital and analog computers. This includes solution of problems by modern numerical, mathematical, and simulation methods using current digital computers and analog techniques. *Prereq: M220, or concurrently enrolled.*

**W410 CONTROL SYSTEMS ANALYSIS AND SIMULATION.** *Four Sem Hrs (3-2).* Analysis of linear automatic control systems using analytical, graphical, and analog techniques. Formulation of the control system equation and transfer function. Steady-state and transient system response. Application of graphical methods of system analysis including the use of root locus, Bode plot, and Nichols chart. System compensation by root locus and frequency response techniques. Laboratory application of theory developed in the classroom. *Prereq: E809 or S840 or S841.*





**W413 WEAPONS SYSTEMS CONTROL.** *Four Sem Mtrs (3-2).* An introduction to the fire control problem including miss-producing effects. The methods of solution of the weapons control problem. The concept of open and closed loop operations of weapons systems. The role and function of computers in weapons systems. Analysis of linear automatic control systems. Instrumentation and guidance techniques for weapons systems. Weapons systems analysis. *Prereq: M224, S306.*

**W411 BALLISTICS AND WEAPONS CONTROL.** *Four Sem Hrs (3-2).* Principles of selected phases of the weapons control problem including propulsion systems, trajectories and flight paths, damage criteria, and associated computer simulation. Analysis of system components such as warheads, both conventional and nuclear fuzes, guidance and control systems, overall weapon system effectiveness and kill probability. A generalized classification of fire control systems. Basic backgrounds in statistics, mechanics, physics, mathematics, and thermodynamics are applied. Laboratory instruction includes probability, explosives testing, shock-wave phenomena and rocket engineering testing and design. *Prereq: M309, W411.*

**W432 SYSTEMS DESIGN (WEAPONS).** *Four Sem Hrs (3-2).* An all-inclusive exercise in the total system concept of design essential to the understanding of modern weapon systems, with particular emphasis on laboratory application. Laboratory work stresses particular applications of general systems morphology taught in the classroom through the vehicle of system design projects brought to fruition by the student. Primarily designed as the final course in Systems Engineering major or minor programs. *Prereq: W931 or W933.*

**W707 DIGITAL COMPUTERS—FUNDAMENTALS, PROGRAMMING, AND UTILIZATION.** *Three Sem Hrs (3-0).* An introduction to the principles of digital computer programming; automatic programming languages with emphasis on working systems of FORTRAN II-D. Practical problem-solving methods. Through problem solving, students acquire a working knowledge of the IBM 1620/1311 and the IBM 1130 data processing systems. Problem-solving techniques involving modern numerical methods are employed to solve a wide range of problems which are related to course work in other departments.

**W708 ANALOG COMPUTERS—FUNDAMENTALS, PROGRAMMING, AND OPERATION.** *Three Sem Hrs (3-0).* Principles of analog computation to include computer functioning, the solution of linear and nonlinear system equations, methods for scaling both in time and magnitude, simulation of linear and nonlinear systems. Problem solution for linear systems is performed in the time and Laplace domains. Extensive use is made of the computer in classroom and applicatory work. *Prereq: M224, or concurrently enrolled.*

**W904-905 INDEPENDENT STUDY/PROJECT.** *Three Sem Hrs Each Term (3-0, 3-0).* A creative, technical, independent study/project in an aspect of the weapons field. Study requires the student to have a Weapons Department Adviser. If the study/project is of sufficient magnitude or depth, it may be continued for a second semester. *Prereq: Approval of the Head of Department.*

**W931 AUTOMATIC CONTROL SYSTEMS I.** *Four Sem Hrs (3-2).* Analysis of automatic control systems. Open and closed-loop systems. Formulation of transfer functions from physical systems, including mechanical, electrical and hydraulic components. Block diagrams and signal flow graphs. Stability analysis in the S-plane and in the frequency-response plots. Introduction to design techniques. Simple compensation schemes. Digital and analog computers are used extensively in the laboratory applications of the theory. *Prereq: W332, or Coreq: E809 or E715 or E815 or S840 or M721 or M751.*

**W932 AUTOMATIC CONTROL SYSTEM II.** *Four Sem Hrs (3-2).* An extension of the theory developed in Automatic Control Systems I, with the emphasis in linear systems now on synthesis as opposed to analysis as in the previous course. This is done by both the frequency-response and S-plane approaches. Introduction to optimum parameter synthesis. Effect of nonlinear components and nonlinear control systems behavior. Techniques for the analysis of nonlinear systems, including piecewise linear analysis, describing function, and phase-plane analysis. Introduction to state-variable techniques and Liapunov's second method. Laboratory instruction making use of digital techniques and analog simulation of both linear and nonlinear systems. *Prereq: W931.*





W933 DIGITAL TECHNOLOGY. *Four Sem Hrs (3-2)*. Course covers number systems for basic machine language programming, functioning of input-output, memory, and the various controls. Fundamentals of logical design for digital circuitry, including the use of Boolean algebra in symbolic logic and the analyses of basic logical circuits are developed. Instruction also encompasses synthesis of switching circuits, memory devices, circuit components, and machine-aided logical design. Computer circuits are evaluated in the laboratory. *Prereq: W351 or W707.*

W934 SAMPLED-DATA CONTROL SYSTEMS. *Four Sem Hrs (3-2)*. A study of the response of control systems to discrete and sampled-continuous inputs; basic theory of sampling; quantizing and data reconstruction; the Z-transformation and the Z-plane; stability of sampled-data feedback systems; compensation in the Z-plane; and optimization of system performance through the use of digital components. *Prereq: W931.*

W951 APPLICATIONS OF COMPUTER TECHNOLOGY. *Four Sem Hrs (3-2)*. A study of the application of individual and combined digital and analog techniques to the solution of problems arising in weapons systems. Hybrid systems are designed and tested. Emphasis is placed on problem analysis, including problem definition and plan of attack, and laboratory solution. Course is shaped in accordance with the students' needs and desires. Depending upon extent, one or several projects will be undertaken by each student. *Prereq: W933.*







## Professional Training

The Commandant of Midshipmen is responsible for the Professional Training Program. The program is a vital part of each midshipman's professional training during his four years at the Academy. It includes certain courses offered at the Academy during the academic year and during the summer, as well as summer training conducted away from the Academy with operational and training units of the Fleet.

Midshipmen are graded on their interest and performance in the professional program just as they are for their performance in the academic program. A midshipman's overall standing within his class at graduation depends very significantly on his grades received for professional training.

The Executive and Physical Education Departments, as well as several academic departments, offer courses in the professional program. Courses and drills offered by these departments are described in the following chronological summary. P-courses are offered by the Naval Science Department, X- and T-courses by the Executive and Physical Edu-



cation Departments, respectively. Other departmental letter designations are the same as those used with the academic program.

#### FOURTH CLASS SUMMER

**P100 BASIC SEAMANSHIP AND NAVIGATION.** Practical instruction in elementary seamanship, including marlinespike and deck seamanship, sailing of knockabouts and yawls, power-boat handling, rules of the nautical road, visual signaling (flashing light and flags), elementary piloting and lookout procedures, and indoctrination in the fundamentals of shiphandling aboard Yard Patrol Craft.

**P101 SEAPOWERS I.** An introduction to the naval profession. Provides basic knowledge of the mission and capabilities of the U.S. Navy, with particular emphasis on the unique characteristics of a naval career.

**T100 PHYSICAL EDUCATION ORIENTATION AND INDOCTRINATION.** Preliminary examinations in swimming, posture, and athletic ability. Testing in physical achievement with subsequent preparation of class grouping. Physical education drills in fundamentals of swimming, boxing, wrestling, posture, and personal conditioning. Indoctrination drills in lacrosse, fencing, soccer, rugby, gymnastics, crew, golf, tennis, squash racquets, and track.

**W100 SMALL ARMS.** Practical instruction in nomenclature, field stripping, and assembly of small arms. Firing of service rifle and pistol. Those who qualify are awarded the U.S. Navy Expert Rifleman Medal and/or the U.S. Navy Expert Pistol Medal.

**X100 ORIENTATION AND INDOCTRINATION.** An elementary course to orient the new midshipman to the Naval Academy and to the Naval Service, to indoctrinate him with the way of life at the Naval Academy, including his duties as a midshipman and the Academy's mission, ideals, standards, traditions, and customs.

**Y100 FUNDAMENTALS OF NAVAL HYGIENE.** The fundamentals of personal hygiene, including mental and physical hygiene and first aid.

#### FOURTH CLASS YEAR

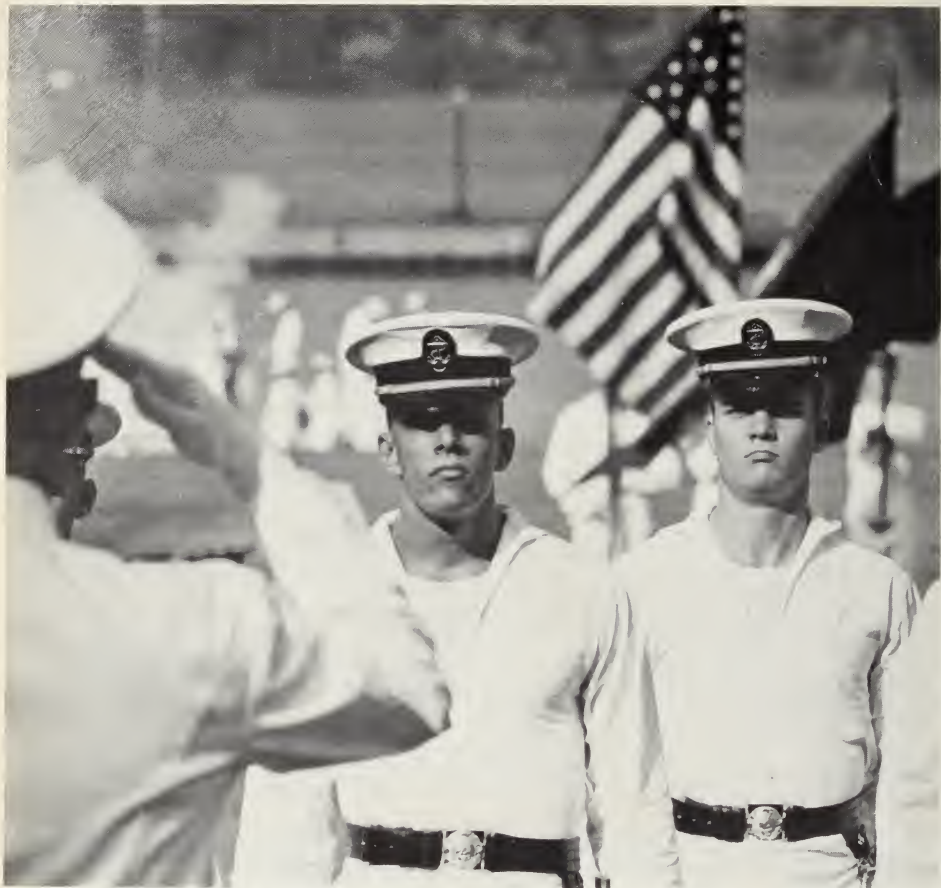
**P102 BASIC DECK SEAMANSHIP.** Practical instruction afloat in Yard Patrol Craft during advanced exercises with midshipmen of the upper classes. Fourth Classmen are introduced to shipboard at-sea environment and are assigned as lookouts, sound-powered telephone talkers, signalmen, and helmsmen. Additional instruction is included in safety and survival at sea, line handling, anchors and anchoring, and in marlinespike seamanship.

**T101 & T102. PHYSICAL EDUCATION.** Fundamentals of badminton, soccer, swimming, boxing, wrestling, gymnastics, golf, tennis, posture, volleyball, basketball, handball, bowling, squash racquets, and personal conditioning. Tests in applied strength, agility, swimming, boxing, wrestling, and gymnastics.









X101 & X102 INFANTRY DRILL. Two hours per week of infantry drills and dress parades for 8 weeks during both the fall and spring.

### THIRD CLASS SUMMER

P201 AT-SEA TRAINING. During summer at-sea training, the Third Classman is introduced to life aboard ships of the Fleet by serving in specific billets and actively participating in a wide range of shipboard evolutions. He lives the life of the enlisted man, performing routine ship's work, standing deck and engineering watches, operating ship's boats, and exercising at shipboard drills. He completes the required practical factors for seaman and fireman and takes a comprehensive examination on these factors.

### THIRD CLASS YEAR

T201 & T202 PHYSICAL EDUCATION. Continuation of instruction in swimming, boxing, wrestling, personal conditioning, tennis, and gymnastics, with tests in applied strength, agility, swimming, boxing, wrestling, and gymnastics.



X201 & X202 INFANTRY DRILL. Two hours per week of infantry drills and dress parades for 8 weeks during both the fall and spring.

## SECOND CLASS SUMMER

AVIATION, SUBMARINE AND AMPHIBIOUS TRAINING. Broad professional training in aviation, submarine, and amphibious operations at bases away from the Naval Academy.

## SECOND CLASS YEAR

T301 & T302 PHYSICAL EDUCATION. Advanced instruction in swimming, boxing, tennis, golf, officiating, principles of personal conditioning, and hand-to-hand combat. Tests in applied strength, agility, swimming, and boxing.

X301 & X302 INFANTRY DRILL. Two hours per week of infantry drills and dress parades for 8 weeks during both the fall and spring.

## FIRST CLASS SUMMER

P400 AT-SEA TRAINING. During his second summer at-sea training period, the First Class midshipman becomes familiar with the duties of the junior officer by standing appropriate watches and by discharging administrative responsibilities. He uses the *Watch Officer's Guide* as a reference book. He does a large amount of practical work in navigation, taking sights and determining the ship's position. The First Classman is also introduced to the important responsibilities of a ship's division officer. This is accomplished by precept and example of the division officers on board, and by instruction in the *Division Officer's Guide* and the *Ship's Organization and Regulations Manual*. He is required to keep a "Journal of At-Sea Training" covering his watches and his work in seamanship, the Combat Information Center, communications, basic tactics, navigation, and in administration.

## FIRST CLASS YEAR

T401 & T402 PHYSICAL EDUCATION. Instruction in advanced swimming, personal conditioning, tennis, golf, and athletic administration. Tests in physical fitness.

X401 & X402 INFANTRY DRILL AND NAVAL ORIENTATION. Two hours per week of infantry drills and dress parades for 8 weeks during both the fall and spring. During the winter months, 2 hours per week of naval orientation lectures. The First Class lectures cover areas of importance to the junior officer. The syllabus includes lectures and seminars on professional development, career patterns, administrative responsibilities, enlisted personnel management, leadership, personal finance, fitness reports, legal assistance, and current military affairs.

## PHYSICAL EDUCATION DEPARTMENT

**Head of Department:** Captain J. O. Coppedge; **Executive Officer:** Commander J. S. Donaldson; **Professor:** A. J. Rubino; **Associate Professors:** R. H. Swartz, F. H. Warner, C. W. Phillips, J. N. Rammacher, W. P. Bilderback, J. H. Higgins, H. A. Muller, Jr., A. R. Deladrier, J. M. Gehrdes, A. M. Potter, J. C. Duff, H. W. Lenz, S. N. Belichick; **Assistant Professors:** E. P. Smith, J. M. Cloud, E. C. Peery, D. P. Smalley, L. W. Lawrence, R. I. Brown, Jr., A. A. Cantello; **Lieutenants/Captains (USMC):** R. E. Hartzell, F. K. Duffy, J. J. Cistriano, R. C. Shands (USMC), J. R. Kopka (USMC), R. K. Kinne, L. A. Whitney; **Instructors:** M. Jacobson, R. J. Kopnisky, D. W. Purdy, Jr., **Lieutenant (j.g.):** M. A. Fryer.

### MISSION

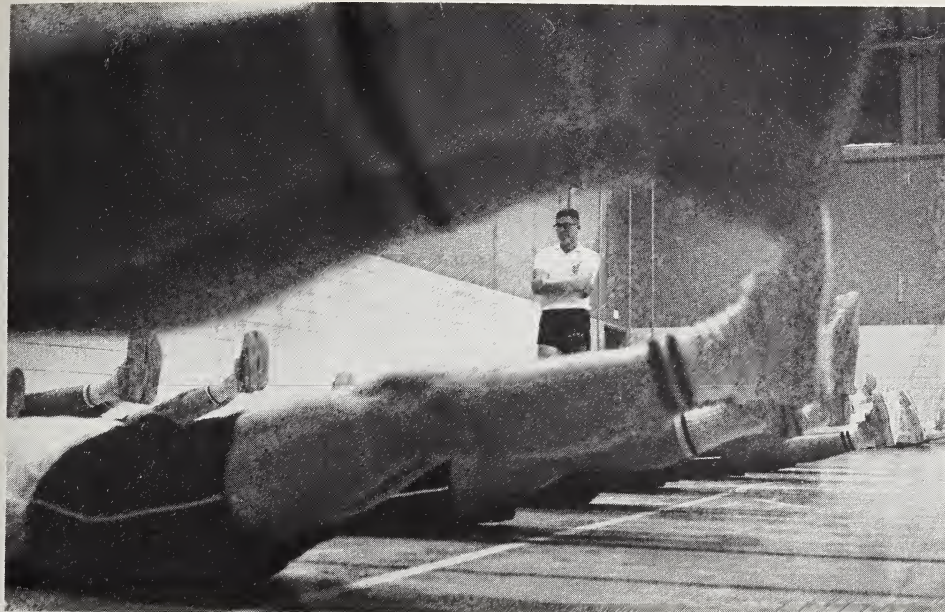
The physical development of midshipmen is the primary mission of the Physical Education Department. This directly supports the mission of the Naval Academy. In carrying out its mission, the Department endeavors to develop each midshipman's skill, strength, endurance, agility, and competitive spirit in order that he may acquire useful habits of physical fitness, be capable of surmounting physical hardships, and be proficient in training and instructing others.

Related objectives of the Physical Education Department are:

- To provide opportunities to develop qualities of moral and physical courage, group loyalty, fair play, leadership ability, and quick thinking while under pressure in highly competitive situations;
- To develop proficiency in aquatics and confidence in meeting emergency situations in the water;
- To develop requisite interest and skill in carry-over sports to insure a proper level of physical fitness after graduation;
- To develop confidence and ability in defending against personal attack;
- To provide instruction in the principles and methods employed in organizing, supervising, and conducting athletic and physical education programs.

### FACILITIES

The Department's athletic facilities are extensive. The Field House, completed in 1957, covers an area approximating a city



block. It provides facilities for basketball, baseball, track, wrestling, boxing, and other sports throughout the year. It is also used for public gatherings, band concerts, etc. The south wing houses a visiting team dormitory with facilities for more than 200 persons. The north wing includes classrooms, a multi-purpose gymnasium, squash courts, "Misery Hall" (first aid and treatment), and other facilities in support of the physical education and athletic programs.

There is a large gymnasium, Macdonough Hall, named in honor of Commodore Thomas Macdonough, Naval hero of the War of 1812. It is approximately 400 feet long and 100 feet wide, and includes a gym deck, and instruction pool, squash and handball courts, wrestling and fencing lofts, three boxing rings, and another "Misery Hall." It also contains the Natatorium, one of the largest covered pools in the United States (150 feet long, 60 feet wide).

In addition, the Naval Academy has the following areas available for midshipmen recreation and competition: recreational tennis courts (24), varsity tennis courts (6), baseball stadium, golf course (18 holes), and recreational fields (over 100 acres).









## The Athletic Program

Through athletics, the Naval Academy fulfills its responsibility to develop midshipmen physically—one third of its three-pronged mission. Few institutions in the Nation offer a more all-encompassing athletic program. Twenty-one varsity and 23 intramural sports challenge every talent and interest. All midshipmen participate, either at the varsity or intramural level. The varsity program is conducted by the Athletic Department, while the Physical Education Department conducts the intramural program.

Excellent facilities support the athletic program. A large and modern field house accommodates both athlete and spectator for varsity basketball, wrestling, and track. The one-eighth mile dirt track surrounds a large open area containing a full-sized baseball infield. Other field house facilities include squash courts and a multi-purpose gymnasium.

Swimming pools, boxing rings, fencing and wrestling lofts, rifle and pistol ranges, and



handball and badminton courts complete the indoor facilities.

Outside, there are more than 100 acres of lighted playing fields, an 18-hole golf course, tennis courts, and a baseball field.

Home football and lacrosse games are played in the Academy's nearby Navy-Marine Corps Memorial Stadium, with seating for 28,000 spectators. Dedicated in 1959, this beautiful memorial was built entirely with private funds, donated primarily by officers and men of the Navy and Marine Corps.

## INTERCOLLEGIATE ATHLETICS

Midshipmen meet topflight competition in 21 varsity sports from football to fencing, swimming to sailing, and soccer to squash.

Navy meets its most time-honored opponent, Army, in 17 different engagements each year. Other top-level competition is regularly provided by such opponents as Notre Dame in football, Princeton in basketball, Columbia and New York University in fencing, Penn State in gymnastics, Johns Hopkins and Maryland in lacrosse, Lehigh in wrestling, Harvard in squash, and Yale in swimming.

In addition to a busy home schedule, Navy teams travel regularly along the Eastern seaboard and, on occasion, nationally in search of competition. Within recent years the football team has competed in such far-flung cities as San Francisco, Dallas, Boston, Denver, Detroit, and Atlanta, to name just a few.

Win or lose (but usually winning), the midshipmen give a spirited account of themselves. Navy teams and athletes regularly earn their share of Eastern, National, and All-American honors.

The Naval Academy offers midshipmen the opportunity to compete in the following varsity sports: baseball, basketball, crew (heavyweight and lightweight), cross country, fencing, football (varsity and lightweight), golf, gymnastics, lacrosse, pistol, rifle, sailing, soccer, squash, swimming, tennis, track (indoor and outdoor), and wrestling.

## Fall Sports

Navy football needs little introduction. The Army-Navy game, the Navy's John Cartwrights, Rob Taylors, Roger Staubachs, Joe Bellinos, Slade Cutters and other great players have helped spread the Spirit of the Naval Academy to every corner of the land. In



addition to Army, the challenging 10-game schedule features such fine teams as Notre Dame, Georgia Tech, Penn State, Michigan, Syracuse, and the Air Force Academy.

Football is not restricted to the varsity level. Spots are also open on Navy's lightweight team, a perennial contender for the Eastern championship, the junior varsity squad, or the plebe eleven.

Cross country, sailing, and soccer shares the autumn spotlight with football. National Collegiate Champions in 1964, Navy's soccer team received five consecutive bids to the Collegiate tournament from 1963-67.

### Winter Sports

The tempo heats up as the arrival of winter drives the athletic program indoors where midshipmen direct their energies to nine different sports.

Competing primarily in the East, Navy basketball teams have given an excellent account of themselves over the years. The fencing, rifle, pistol, and squash clubs are consistently in the running for National honors.

Wrestling, long a favorite at the Academy, saw Navy take the Eastern title in 1968. Gymnastics, swimming, and track complete the busy winter sports picture.

### Spring Sports

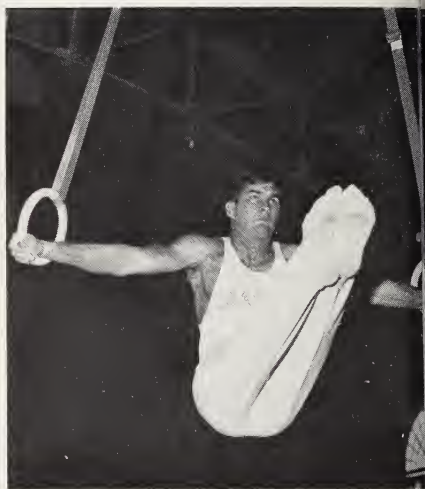
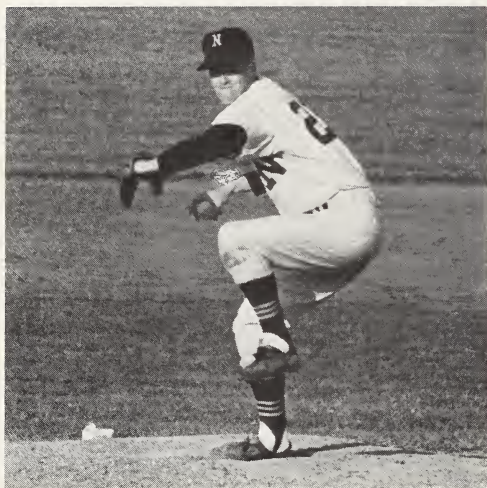
The familiar—baseball, tennis, golf, track—and the unusual—lacrosse, sailing, and crew, blend to produce a well-balanced spring program.

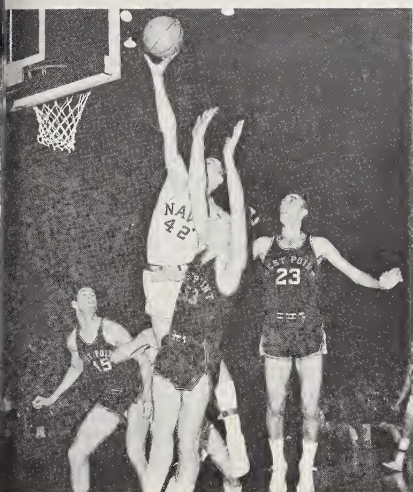
Navy competes in the Eastern Intercollegiate Baseball League, which includes the Ivy League schools and Army. The netters and golfers are also active in Eastern circuits.

The midshipmen's ambitious rowing program includes three shells—varsity, junior varsity and plebe, both heavyweight and lightweight. Navy's crew last competed in the Olympic Games in 1960. The midshipmen were gold medal winners for the United States in 1952.

Lacrosse—a highly popular spring sport—takes its roots from the rugged game originated by the American Indians. Navy won or shared eight consecutive National titles in lacrosse from 1960-67.

## VARSITY SPORTS







## INTRAMURAL SPORTS



## THE INTRAMURAL SPORTS PROGRAM

Midshipmen not on varsity teams are required to participate in intramural sports. Thus, every midshipman at the Academy has the opportunity to enjoy the benefits of competitive athletics at a level appropriate to his athletic ability.

The intramural sports program is under the supervision of the Physical Education Department. Competition is organized at the battalion and company levels, and trophies are awarded to championship teams. Intramural sports include:

Basketball	Handball	Tennis
Boxing	Lacrosse	Touch football
Crew	Rugby	Track
Cross country	Soccer	Volley ball
Fencing	Softball—fast pitch	Water polo
Field ball	Softball—slow pitch	Weight lifting
Football	Squash	Wrestling
Gymnastics	Swimming	

## THE NAVAL ACADEMY ATHLETIC ASSOCIATION

The Naval Academy Athletic Association is a non-profit organization charged by the Superintendent with the responsibility for providing and administering the intercollegiate sports program for the midshipmen. It is headquartered at the Naval Academy. The Association discharges its responsibility without the use of appropriated funds.

The Association arranges the varsity schedules, provides coaching staffs and equipment, and maintains a central office to handle the administrative details of the athletic program.

The Naval Academy, a member of the Eastern College Athletic Conference (ECAC) and the National Collegiate Athletic Association (NCAA), is represented in and conforms to the regulations of these organizations through the offices of the Naval Academy Athletic Association.









## The Extracurricular Program

Life at the Academy offers midshipmen a varied and wide-ranging choice of extracurricular activities. Weekend dances and other social activities head the popularity list for many. Musically, there are the Antiphonal Choir, the Protestant Choir, the Catholic Choir, the Glee Club, the Drum and Bugle Corps, the Concert Band, the midshipmen's ever-popular jazz and dance band, the NA-10, and the Spiffies for rhythm and blues, rock-and-roll, and the latest in popular music.

Publications are numerous and varied. There is the *Lucky Bag*, the yearbook for each class. There is the literary and artistic *Trident Magazine* and the less serious and more typical campus magazine, the *Log*. There is also the *Trident Calendar*, embellished by photographs and cartoons. And, finally, there is *Reef Points*, a guide to Academy and Navy organization, lore, and customs for the incoming plebes.

Dramatic activity includes the Masqueraders, the Stage Gang, the Property and Make-up Gang, the Juice (electrical) Gang, and the Musical Clubs Show.

Clubs include the Photographic Club, the Art and Printing Club, the Radio (ham) Club, the Scuba Club, the Varsity "N" Club, the Foreign Relations Club, and the Foreign Languages Club—with separate branches in each of seven different languages.

There are numerous Class organizations and officers. And, though they by no means complete the listing of extracurricular activities, there are the debaters and the midshipmen's radio station WRNV. The Academy's professionally oriented sailing and YP Squadron programs are discussed separately and in detail on succeeding pages.



## Sailing

Sailing at the Academy has a serious professional purpose. It is also fun. The program is extensive and many-faceted. And there is sailing for every taste—from basic instruction to ocean racing, and from leisurely afternoon cruising to the keen competition of high-performance Skipjack dinghies.

Skills and knowledge of seamanship and the sea gained under sail are the same basic skills and knowledge used by seamen for centuries. They are as relevant in bringing a ship safely home to port today as they ever were. Thus, by developing better seamen, the Academy's sailing program contributes to the development of better naval officers.

Sailing is easily the most popular extracurricular activity at the Academy, with almost 1,000 midshipmen engaged in competitive or recreational sailing. And, judging by the look of things along the seawall on weekends, sailing is equally popular with drags (dates).

The Academy has one of the finest sailing fleets in the world as well as some of the best known boats in ocean-racing circles. The fleet ranges from the 110-foot *Le Voyageur* through the 50-foot yawls *Annie D* and *Gypsy* to 12-foot interclub dinghies. Recently, two new standouts have been added to the ocean racing fleet: *Ondine*, winner of numerous championships and probably the most famous ocean racer of our day, and the renowned yawl *Maredea*. Two Finns and four Flying Dutchmen provide an opportunity for Olympic-type competition.









The Naval Science Department conducts basic training in sail during Plebe Summer, using the Academy's fleet of thirty 26-foot knockabouts and twelve 44-foot Luders yawls. After Plebe Summer all sailing is voluntary, either varsity or extracurricular.

Twenty-six Skipjacks and five 30-foot Shields sloops are available to members of the Varsity Sailing Team . . . which races in intercollegiate competitions from coast to coast. Other races during the academic year include open competition in the Chesapeake Yacht Racing Association aboard the Shields sloops, Luders yawls, and the larger yachts.

The Academy sponsors numerous intercollegiate and Bay regattas. Both the McMillan Cup and John F. Kennedy Memorial Regattas are hosted by the Academy. During the summer, the larger yachts are sailed in the open sea in such races as the Bermuda and Annapolis-Newport ocean races. Other races include the Gibson Island Yacht Squadron race to Cape May, the Chesapeake Lightship Race, the Cape May to Newport Race, the Marblehead-Halifax Race, and the Buenos Aires to Rio de Janeiro Race. Midshipmen skipper the yachts in Bay races and crew in ocean races.

Intercollegiate sailing is conducted by the Physical Education Department. Other sailing beyond the primary stage is administered by the Naval Academy Sailing Squadron, an organization of officers, faculty, and other devotees of sailing. Besides being highly popular, Squadron-arranged weekend sailing trips give midshipmen a chance to carry the spirit of the Navy to nearby ports.







## The YP Squadron

The Naval Academy YP Squadron is organized for midshipmen who desire more extensive training afloat than is offered by summer at-sea training and the Naval Science Department's curriculum. The Squadron consists of seven Yard Patrol craft assigned one to each of the six battalions with the seventh assigned as flagship of the entire Squadron.

The organization and practices of the YP Squadron are very similar to those of Fleet destroyer squadrons on duty around the world. The "officers" are midshipmen First Class selected annually in recognition of their ability to fulfill command positions. The Squadron Commodore is responsible for the overall performance and excellence of the Squadron, including the coordination of training, proficiency competition, inspections, and cruises. Assisting him are a Chief Staff Officer, two Division Commanders, and an Administration Officer. Completing the staff is an Engineering Officer who supervises training in engineering and insures that engineering equipment is operated and maintained properly. Each Yard Patrol craft is commanded by a First Classman who is assisted by a 20-man crew composed of midshipmen from all classes.

Training is serious business during the week. Crews get underway on Tuesday, Thursday, and Friday afternoons. Mondays and Wednesdays are reserved for classroom drills and instruction. In addition to daily training sessions, weekend cruises are conducted to Washington, D.C., Norfolk, Va., Philadelphia, and to various Chesapeake Bay ports.

Competition between YP's for the "Battle Efficiency Pennant" is keen. The crew adjudged most proficient overall in tactics, deck seamanship, piloting, communications, and engineering is declared the winner.





## Administration

The administration of the Naval Academy is in many respects analogous to that of any college. A Board of Visitors performs the broad supervisory functions of a board of trustees. The Superintendent, like a college president, is the executive head of the Academy. He is assisted by the Commandant of Midshipmen, whose function is somewhat like that of a dean of students, the Academic Dean, and an administrative staff. The Superintendent, the Commandant, the Academic Dean, and other senior members of the faculty comprise the Academic Board, which makes major academic decisions and sets the academic standards for the Academy. Military, professional, and physical training come under the Commandant. The Academic Dean heads the academic program.

### THE BOARD OF VISITORS

A Board of Visitors to the Naval Academy is constituted annually of the Chairman of the Committee on Armed Services of the U.S. Senate, or his designee; three other members of the Senate designated by the Vice President of the United States or the President *pro tempore* of the Senate, two of whom are members of the Committee on Appropriations of the Senate; the Chairman of the Committee on Armed Services of the U.S. House of Representatives, or his designee; four other members of the House of Representatives, two of whom are members of the Committee on Appropriations of the House of Representatives; and six persons designated by the President of the United States.

The Board meets at least once each year at the Naval Academy



to inquire into the state of morale and discipline, the curriculum, instruction, physical equipment, fiscal affairs, academic methods, and related matters, and submits a written report of its action and its views and recommendations to the President of the United States.

The members of the 1968 Board of Visitors are as follows:

*Appointed by the President of the United States*

**Mr. Guy Stillman, Chairman**

Consulting Engineer, Phoenix, Ariz.

**Dr. Wilson H. Elkins**

President, University of Maryland

**Dr. Edwin D. Etherington**

President, Wesleyan University

**Dr. Edwin D. Harrison**

President, Georgia Institute of Technology

**Mr. George W. Grider**

General Counsel and Secretary

The Carborundum Company

**Mr. William A. Shea**

Attorney, New York City

*Appointed by the Vice President*

**Senator Paul J. Fannin, Arizona**

**Senator John O. Pastore, Rhode Island**

**Senator Ralph W. Yarborough, Texas**

*Appointed by the Speaker of the House*

**Representative Daniel J. Flood, 11th District of Pennsylvania**

**Representative Glenard P. Lipscomb, 24th District of California**

**Representative Hervey G. Machen, 5th District of Maryland**

**Representative Rogers C. B. Morton, 1st District of Maryland**

*Ex Officio Members*

**Senator Daniel B. Brewster, Maryland**

(Designee of Senator Richard B. Russell, Chairman, Committee on Armed Services, U.S. Senate.)

**Representative Floyd V. Hicks, 6th District of Washington**

(Designee of Representative L. Mendel Rivers of South Carolina, Chairman, Committee on Armed Services of the U.S. House of Representatives.)

## THE ACADEMIC ADVISORY BOARD

The Academic Advisory Board was formed by the Secretary of the Navy to advise the Superintendent concerning the Academy's academic program. The Board held its initial meeting at the Academy in the fall of 1966. Meetings are held periodically during the year.

Members of the Academic Advisory Board are as follows:

**Dr. Herbert E. Longnecker, Chairman**

President, Tulane University

**Dr. Carey Croneis**

Chancellor, Rice University

**Dr. Milton S. Eisenhower**

President Emeritus, The Johns Hopkins University

**Dr. Richard G. Folsom**

President, Rensselaer Polytechnic Institute

**Mr. John F. Gordon**

Member of the Board of Directors,

General Motors Corporation

**Mr. Harold H. Helm**

Chairman of the Executive Committee,

Chemical Bank New York Trust Company

**Mr. Augustus C. Long**

Member of the Board of Directors, Texaco, Inc.

**Professor George J. Maslach**

Dean, College of Engineering, University of California (Berkeley)

**Mr. William E. McGuirk, Jr.**

Chairman of the Board and Chief Executive Officer

Mercantile Safe Deposit & Trust Company

**Admiral Horacio Rivero, Jr., USN**

Commander-in-Chief, Allied Forces Southern Europe.

**Dr. George P. Shultz**

Dean, Graduate School of Business, University of Chicago

**Vice Admiral William R. Smedberg, III, USN (Ret.)**

Past President, U.S. Naval Academy Alumni Association



*The Board of Visitors*



*The Academic Advisory Board*



*The Commandant*



*The Academic Dean*



## Staff and Faculty

### ADMINISTRATION

**Superintendent:** Rear Admiral James F. Calvert, USN; B.S., U.S. Naval Academy; National War College.

**Commandant of Midshipmen:** Captain Lawrence Heyworth, Jr., USN; B.S., U.S. Naval Academy; U.S. Naval War College.

**Academic Dean:** Dean A. Bernard Drought; B.E., Milwaukee State Teacher's College; M.A., Northwestern University; M.S., S.D., Harvard University.

**Chief of Staff and Aide:** Captain Robert E. Hawthorne, USN; B.S., U.S. Naval Academy; U. S. Naval War College.

**Director of Athletics:** Captain John O. Coppedge, USN; B.S., U.S. Naval Academy; M.A., The George Washington University; U.S. Naval War College.

**Dean of Admissions:** Dean William S. Shields; A.B., M.A., Ph.D., Western Reserve University; University of Paris; Navy Japanese Language School.

### SUPERINTENDENT'S STAFF

**Executive Assistant:** Captain Donald C. Bayly, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

**Director of Plans and Policy:** Lieutenant Commander John D. Rohrbough, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

**Personal Aide:** Lieutenant Commander Stephen A. Wise, USN; B.S., U.S. Naval Academy; U.S. Naval Postgraduate School.

**Flag Lieutenant and Aide:** Lieutenant Harry P. Salmon, USN; B.S., U.S. Naval Academy.

## CHIEF OF STAFF

**Chief of Staff:** Captain Robert E. Hawthorne, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

**Senior Chaplain:** Captain Robert F. McComas, CHC, USN; A.B., Clark University; S.T.B., Boston University; S.T.M., Harvard University.

### *Departmental Staff:*

Commander Charles L. Greenwood, CHC, USN; *B.S., U.S. Naval Academy; B.D., Princeton Theological Seminary; T.H.M., Harvard Divinity School.*

Lieutenant Commander Eugene C. O'Brien, CHC, USN; *B.S., Marquette University; M.A., Fairfield University; S.T.L., Catholic University of America.*

Commander John F. Laboon, Jr., CHC, USN; *B.S., U.S. Naval Academy; B.A., M.A., Ph.L., Woodstock College.*

Lieutenant Commander Leroy E. Vogel, CHC, USN; *B.A., Concordia College; B.D., Concordia Theological Seminary.*

**Personnel and Administrative Officer:** Commander David F. Staple, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

**Administrative Officer:** Mr. Maynard C. Jones.

**Comptroller:** Commander Raymond P. Davis, SC, USN; M.S., The George Washington University; U.S. Naval Postgraduate School.

**Security and Plans Officer:** Commander James R. Messner, USN.

**Management Engineer:** Colonel William K. Davenport, USMC (Ret.); B.S., U.S. Naval Academy; M.S., The George Washington University; Command and General Staff School; Industrial College of the Armed Forces.

**Public Affairs Officer:** Lieutenant Commander Jack M. White, USN; A.B., Central Michigan University; M.A., University of Michigan; Ph.D., Michigan State University.

**Assistant Public Affairs Officer for Radio and TV:** Mr. Harmon H. Marks; B.A., Morris Harvey College; M.A., Ohio State University.

**Assistant Public Affairs Officer for Visits and Photography:** Lieutenant Commander Thomas M. Browne, USN; B.S., U.S. Naval Academy.

**Legal and Legal Assistance Officer:** Commander Charles E. Waite, USN; B.S.C., Loyola University; M.A., The George Washington University; L.L.B., Temple University; Naval War College.

**Communications Officer:** Lieutenant Richard J. Fairhurst, USN.

**Supply and Fiscal Officer:** Captain Marvin S. Hutchison, SC, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

**Public Works Officer:** Captain Donn L. Ashley, CEC, USN; B.S., U.S. Naval Academy; B.C.E. Rensselaer Polytechnic Institute; M.A., The George Washington University; U.S. Naval War College; P.E.

**Manager, Commissioned Officer's Mess (Open):** Mr. Frank B. O'Connell.

**Industrial Relations Officer:** Mr. Frank P. Bruther.

#### NAVAL ACADEMY MUSEUM

**Director:** Captain Dale Mayberry, USN (Ret.); B.S., U.S. Naval Academy; M.S., Stanford University; M.A., The George Washington University; U.S. Naval War College; National War College.

#### ADMISSIONS, PUBLICATIONS AND RECORDS

**Dean of Admissions:** Dean William S. Shields; A.B., M.A., Ph. D., Western Reserve University; University of Paris; Navy Japanese Language School.

**Admissions Officer:** Mr. Wilbur H. McNew, Jr.

**Registrar:** Professor Edward T. Heise; B.S., St. John's College; M.A., Johns Hopkins University; M.A., Middlebury College; University of Paris.

**Assistant Registrar:** Mr. James F. Kimball.

**Recruiting and Candidate Guidance Officer:** Lieutenant Commander Thomas B. Potter, USN; B.S., U.S. Naval Academy; U.S. Naval Postgraduate School.



**Assistant Recruiting and Candidate Guidance Officer:** Lieutenant W. Minor Carter, USN; B.S., U.S. Naval Academy.

**Assistant Recruiting and Candidate Guidance Officer:** Lieutenant Vady R. Clark, USN; B.S., U.S. Naval Academy.

**Statistical Evaluation Officer:** Dr. Bernard F. Sutton; B.S., M.S., Ed.D., Indiana University.

**Publications Officer:** Mr. Edward P. Wilson, Jr., B.S., U.S. Naval Academy.

## COMMANDANT OF MIDSHIPMEN

**Commandant.** Captain Lawrence Heyworth, Jr., USN; B.S., U.S. Naval Academy; U.S. Naval War College.

**Head, Executive Department:** Captain Bryan B. Brown, Jr., USN; B.S., U.S. Naval Academy; M.S., Aero. Eng., U.S. Naval Postgraduate School.

**Head, Physical Education Department:** Captain John O. Coppedge, USN; B.S., U.S. Naval Academy; M.A., The George Washington University; U.S. Naval War College.

**Head, Medical Department:** Captain Clyde S. Stroud, Jr., MC, USN; Southern Methodist University; M.D., Baylor University.

**Head, Dental Department:** Captain Raymond H. Friesz, DC, USN; D.D.S., Marquette University; M.Sc. (Dent.), University of Pennsylvania.

**Head, Midshipmen Supply Department:** Captain Marvin S. Hutchison, SC, USN; B.S., U.S. Naval Academy; U.S. Naval War College.

**Head, Midshipmen Financial Division:** Commander Dean L. Kellogg, SC, USN; B.S., U.S. Naval Academy; M.S., University of Kansas.

**Head, Midshipmen Store and Services Division:** Commander Bruce A. Benson, SC, USN; B.S., U.S. Naval Academy; M.A., The George Washington University; U.S. Naval War College.

**Head, Midshipmen Mess Division:** Lieutenant Commander Perry L. Westmoreland, SC, USN; B.S., U.S. Naval Academy.

## EXECUTIVE DEPARTMENT

**Head of Department:** Captain Bryan B. Brown, Jr., USN; B.S.,

U.S. Naval Academy; M. S. Aero. Eng., U.S. Naval Postgraduate School.

**Departmental Staff:**

Lieutenant Commander Matthew J. Breen, USN; *B.S., U.S. Naval Academy.*

Lieutenant Brian R. Buchholz, USN; *B.S., U.S. Naval Academy; M.B.A., The George Washington University.*

Lieutenant James M. Curtin, USN; *B.S., U.S. Naval Academy.*

Commander Hubbell Y. Davidson, USN; *B.S. U.S. Naval Academy.*

Commander Walter J. Donovan, USN (Ret.); *B.S., U.S. Naval Academy; Armed Forces Staff College.*



Captain Edward J. Bush, Jr., USMC; *B.S., U.S. Naval Academy.*

Lieutenant John H. Butler, USN; *B.S., U.S. Naval Academy.*

Lieutenant John F. Cleater, USN; *B.S., U.S. Naval Academy.*

Commander Richard G. Colquhoun, USN; *B.S., U.S. Naval Academy; M.A., Stanford University; U.S. Naval War College.*

Major Donald B. Conaty, USMC; *B.S., U.S. Naval Academy.*

Major Matthew T. Cooper, USMC; *B.S., U.S. Naval Academy.*

Lieutenant Colonel William P. Cosgrove, USMC; *B.S., U.S., Naval Academy; M.S., The George Washington University.*

Lieutenant Charles E. Cosky, USN; *B.S., U.S. Naval Academy.*

Lieutenant James F. Duffy, USN; *B.S., U.S. Naval Academy.*

Commander Richard T. Duncan, Jr., USN; *B.S., U.S. Naval Academy.*

Lieutenant Bernard E. Eberlein, USN; *B.S., U.S. Naval Academy.*

Captain Berlis F. Ennis, USMC; *B.S., U.S. Military Academy.*

Lieutenant Frederick O. Fay, Jr., USN; *B.A., Auburn University.*

Lieutenant Steven H. Ferencie, USN; *B.S., U.S. Naval Academy.*

Lieutenant Ernest C. Fischer, USN; *B.S., U.S. Naval Academy.*

Commander George D. Florence, USN; *B.S., U.S. Naval Academy; M.A., The George Washington University.*

Lieutenant James H. Gaul, USN; *B.S., U.S. Naval Academy.*

- Professor Donald C. Gilley; *B.Mus., Oberlin Conservatory; M.Mus., Cincinnati Conservatory; A.A.G.O.*
- Lieutenant Peter K. Glasier, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Robert E. Johannesen, USN; *B.S. U.S. Naval Academy.*
- Lieutenant Colin T. Kagel, USN; *B.S. U.S. Naval Academy.*
- Lieutenant John P. Kelly, USN; *B.S., U.S. Naval Academy.*
- Commander Donald A. Kilmer, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Donald M. King, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Raymond A. Kutch, USN; *B.S., U.S. Naval Academy.*
- Captain John LeCornu, USMC; *B.S., U.S. Naval Academy.*
- Major Ward M. LeHardy, USA; *B.S., U.S. Military Academy.*
- Lieutenant Commander Paul G. Lighton, USN; *A.B., Cornell University.*
- Commander Wesley E. Lindsey, Jr., USN; *B.S., U.S. Naval Academy.*
- Lieutenant Charles W. Lyman, III, USN; *B.S., U.S. Naval Academy.*
- Captain Raymond C. Madonna, USMC; *B.S., U.S. Naval Academy.*
- Mrs. James G. Marshall, *Social Director.*
- Major Frank H. Mitchell, Jr., USMC; *B.S. U.S. Naval Academy.*
- Lieutenant Richard A. Morgan, USN; *B.S., U.S. Naval Academy.*
- Commander Eric A. Nelson, Jr., USN; *B.S. U.S. Naval Academy.*
- Captain Gerald J. Oberndorfer, USMC; *B.S., University of Illinois.*
- Major Reid H. Olson, USMC; *B.S., U.S. Naval Academy.*
- Lieutenant Donald D. Patterson, USN.
- Lieutenant Robert C. Rohr, USN; *B.S., U.S. Naval Academy; M.S., The George Washington University.*
- Lieutenant Robert J. Ross, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Kenneth M. Roxburgh, USN.
- Lieutenant Harry P. Salmon, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Commander Selig Solomon, USN; *B.S., U.S. Naval Academy.*
- W-2 Andrew G. Szlaga, USN.
- Lieutenant (j.g.) John H. Tenbrook, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Lewis H. Thames, USN; *B.S. U.S. Naval Academy; M.S., The George Washington University.*
- Lieutenant Terrence S. Todd, USN; *B.S., U.S. Naval Academy.*
- Lieutenant David D. Troyer, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Commander Preston H. Turner, USN.
- Lieutenant Richard L. Weidman, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Sidney E. Wheeler, USN; *B.S., U.S. Naval Academy.*

## PHYSICAL EDUCATION DEPARTMENT

**Head of Department:** Captain John O. Coppedge, USN; *B.S., U.S. Naval Academy; M.A., The George Washington University; U.S. Naval War College.*

**Executive Officer:** Commander John S. Donaldson, USN; *B.S.,*



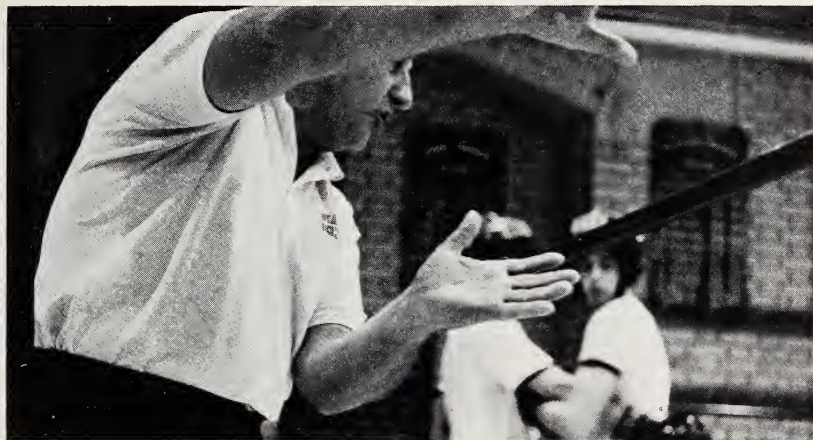
U.S. Naval Academy; M.A., The George Washington University; U.S. Armed Forces Staff College; U.S. Naval War College.

**Deputy Physical Education Officer:** Professor Anthony J. Rubino; B.S., Pennsylvania State University.

**Departmental Staff:**

Associate Professor Stephen N. Belichick; B.A., M.A., *Western Reserve University*.

Lieutenant (j.g.) Michael A. Fryer, USNR; B.S., *Purdue University*.  
Associate Professor James M. Gehrdes;



Associate Professor Willis P. Bilderback; B.Litt., M.Ed., *Rutgers University*.

Assistant Professor Richard L. Brown; B.S., *U.S. Naval Academy*.

Assistant Professor Albert A. Cantello; B.A., *LqSalle College*.

Lieutenant John J. Cistrano, USN; B.S., M.S., *University of Southern Mississippi*.

Assistant Professor Jack M. Cloud; B.S., *William & Mary College*.

Associate Professor Andre R. Deladrier; B.S., *St. John's University*; M.A., *Columbia University*.

Associate Professor Joseph C. Duff; B.S., *West Virginia University*.

Lieutenant Francis K. Duffy, USN; B.S., *U.S. Naval Academy*.

B.S., *Pennsylvania State University*.

Lieutenant Richard E. Hartzell, USNR; B.A., *Beloit College*; M.A., *Roosevelt University*.

Associate Professor John H. Higgins; B.S., *Ohio State University*.

Instructor Michael Jacobson; B.S., *Pennsylvania State University*.

Lieutenant Robbin K. Kinne, USNR; B.S., *East Stroudsburg State College*.

Captain John R. Kopka, USMC; B.S., *University of Bridgeport (Arnold College Division)*.

Instructor Robert J. Kopnisky; B.S., *University of Maryland*.

Assistant Professor Lee W. Lawrence; B.S., M.S., *Springfield College*.

Associate Professor Heinz W. Lenz; *B.S., Ohio State University; M.S., Columbia University.*

Associate Professor Harvey A. Muller; *B.S., M.A., University of Michigan.*

Assistant Professor Edwin C. Peery; *B.S., University of Pittsburgh.*

Associate Professor Chester W. Phillips; *B.S., Temple University.*

Associate Professor Arthur M. Potter; *B.S., M.Ed., Springfield College; M.S., University of Delaware.*

Instructor Dudley W. Purdy, Jr.; *B.S., Elon College; M.Ed., University of North Carolina.*

Associate Professor John N. Ram-

macher; *B.S., Pennsylvania State University.*

Captain Ray C. Shands, USMC; *B.S., Central State Teachers College.*

Assistant Professor David P. Smalley; *B.S., U.S. Naval Academy.*

Assistant Professor Emerson P. Smith; *B.S., Geneva College.*

Associate Professor Raymond H. Swartz; *B.S., Oklahoma State University.*

Associate Professor Floyd H. Warner; *B.S., M.Ed., Springfield College.*

Lieutenant Leonard A. Whitney, USNR; *B.S. Youngstown University; M.S., Springfield College.*

## ACADEMIC DEAN

**Academic Dean:** Dean A. Bernard Drought; *B.E., Milwaukee State Teachers College; M.A., Northwestern University; M.S., S.D., Harvard University.*

**Executive Assistant to Dean:** Major James E. Swab, USMC; *B.S., University of Wisconsin, Armed Forces Staff College.*

**Assistant Dean for Midshipmen:** Captain Walter S. DeLany, Jr., USN; *B.S., U.S. Naval Academy; M.A., Stanford University.*

**Executive Assistant for Midshipmen:** Lieutenant Commander Albert T. Mason, USN; *B.B.A., University of Mississippi.*

**Assistant Dean for Faculty:** Captain Edgar E. Mallick, U.S.N.; *B.S., U.S. Naval Academy; M. E. in Aero. Eng., Massachusetts Institute of Technology; U.S. Naval Postgraduate School.*

**Executive Assistant for Faculty:** Lieutenant Commander Marjorie H. Mogge, USN; *A.B., Oberlin College; M.A., Boston University; U. S. Naval War College.*

**Librarian:** Professor Richard A. Evans; *A.B., Kings College; M.L.S., Syracuse University.*

**Assistant Librarian:** Associate Professor Robert H. Skallerup;

B.S., University of Illinois; A.M., Washington University; M.A., University of Minnesota.

**Assistant Librarian:** Assistant Professor Edward H. Liszewski; B.S., Loyola College; M.S.L.S., Syracuse University.

**Director of Educational Resources:** Lieutenant Commander Richard P. Inman, USN; B.S., U.S. Naval Academy; M.S.E.E., U.S. Naval Postgraduate School.



**Director, Instructional Media:** Assistant Professor Earl T. Knoblock; B.F.A., M.A., Ed.D., Syracuse University.

**Director, Educational TV:** Associate Professor J. Curtis Thompson; B.S., U.S. Naval Academy; M.S.E.E., Catholic University of America.

**Director, Academic Computing Center:** Associate Professor Paul L. Quinn; B.S., U.S. Naval Academy; M.E.E., Catholic University of America.

***Computing Center Staff:***

Lieutenant John M. Greata, USNR;  
*B.S., E.E., Massachusetts Institute  
of Technology.*

Assistant Professor Jesse L. Koontz;  
*B.S., Pennsylvania State University;  
Ph.D., MIT.*

**Scheduling Officer:** Professor Virgil N. Robinson; B.S., M.A., Vanderbilt University; Ph.D., University of Chicago.

**Archivist:** Professor Vernon D. Tate; A.B., University of California (Los Angeles); M.A., Ph.D., University of California (Berkeley).



## PROFESSORS EMERITI

Levi T. Wilson; A.B., A.M., Washington and Lee University; A.M., Columbia University; Ph.D., Harvard University. *Senior Professor of Mathematics.*

Earl W. Thomson; A.B., Clark College; A.M., Dartmouth College. *Senior Professor of Physics.*

Homer B. Winchell; A.B., Princeton University; A.M., Middlebury College. *Senior Professor of Foreign Languages.*

James B. Scarborough; A.B., A.M., University of North Carolina; Ph. D., Johns Hopkins University. *Professor of Mathematics.*

Charles L. Lewis; B.S., Burritt College; A.B., University of Tennessee; A.M., Columbia University. *Professor of English and History.*

Lyman M. Kells; B.A., University of Minnesota; M.A., Ph. D., Columbia University. *Professor of Mathematics.*

David G. Howard; B.S. in E.E., Worcester Polytechnic Institute. *Professor of Electrical Engineering.*

Herman O. Werner; A.B., M.A., Brown University; M.A., Ph. D., Harvard University. *Professor of English, History, and Government.*

Richard S. West, Jr., B.A., Vanderbilt University; M.A., Yale University. *Professor of English, History, and Government.*

## HONORARY PROFESSOR

Honorable William B. Franke, *Former Secretary of the Navy.*

## ENGINEERING DEPARTMENT

**Head of Department:** Captain Randolph W. King, USN; B.S., U.S. Naval Academy; Nav.E., Massachusetts Institute of Technology.

**Executive Officer:** Commander Robert W. Lancaster, USN; B.S., U.S. Naval Academy; B.S. Ae. E., U.S. Naval Postgraduate School; M.S. Ae. E., Princeton University.

**Senior Professor:** Professor Richard D. Mathieu; B.S.Ae.E., M.S.Ae.E., Ph.D.Ae.E., Pennsylvania State University.

### **Departmental Staff:**

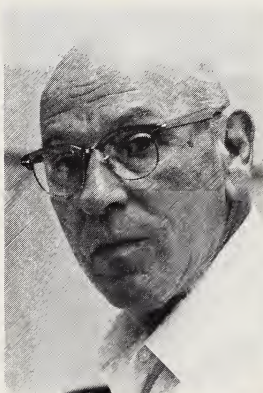
Associate Professor James A. Adams; *B.S., University of Arkansas; M.S., Ph.D., Purdue University.*

Lieutenant (j.g.) Roger A. Adelman, USNR; *B.S.M.E., M.S.M.E., University of Illinois.*

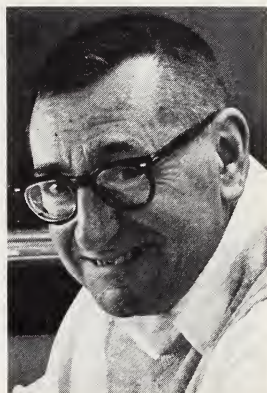
Associate Professor Abdul-Mehsin Alwan; *B.S.C.E., Bornemouth Municipal College of Technology (England); M.S.C.E., Ph.D., University of Wisconsin.*



Assoc. Prof. Dodson



Prof. Johnston



Asst. Prof. Billow

Associate Professor William A. Barr; *B.A., St. John's College; B.S.M.E., University of Virginia; M.S.M.E., Virginia Polytechnic Institute; P.E.*

Professor William J. Battin; *B.S., Swarthmore College; M.S., Princeton University; Ph.D., University of Illinois.*

Assistant Professor Leon M. Billow; *B.S.Ed., State Teachers College, Millersville, Pennsylvania; M.Ed., University of Maryland.*

Professor Arthur E. Bock; *B.S.M.E., Kansas State University; M.S., Virginia Polytechnic Institute; P.E.*

Associate Professor Bernard H. Carson; *BS.Ae.E., M.S.Ae.E., Ph.D.*

*Ae.E., Pennsylvania State Univ.*

Assistant Professor Thomas D. Clark, Jr.; *B.S.M.E., University of Southwestern Louisiana; M.S.M.E., Louisiana State University; P.E.*

Lieutenant Maurice E. Clark, USN; *B.S., U.S. Naval Academy; B.S.Ae.E., U.S. Naval Postgraduate School.*

Lieutenant Colonel John M. Cockey, USMC; *B.S., U.S. Naval Academy; B.S.Nuc.Phys., U.S. Naval Postgraduate School.*

Assistant Professor Roger H. Compton; *B.S., Nav.Arch. & Mar.Engr., M.S. Nav.Arch., Webb Institute of Naval Architecture.*

Lieutenant Commander Norman A. Deam, USN; *B.S., U.S. Naval Academy; B.S.Ae.E., U.S. Naval Postgraduate School; M.S.E., University of Michigan.*

Associate Professor Herbert C. Demart; *B.S.C.E., M.S.C.E., University of Pittsburgh.*

Lieutenant (j.g.) Douglas S. Diehl, CEC, USNR; *B.S.C.E., M.S.C.E., Purdue University.*

Associate Professor Elliott E. Dodson; *B.M.E., Clemson University; M.S.,*

- Pennsylvania State University.*
- Lieutenant Thomas R. Dyer, USNR; *B.S., Stanford University; S.M., Nav.Arch. & Mar.Engr., Massachusetts Institute of Technology.*
- Associate Professor Wayne F. Eckley; *B.S., Illinois Wesleyan University; M.S., University of Illinois.*
- Lieutenant Commander Keith P. Garland, USN; *B.S., U.S. Naval Academy.*
- Assistant Professor John O. Geremia; *B.A., B.S., Columbia University; M.S.E., The George Washington University.*
- Lieutenant Commander Carl E. Giese, Jr., USN; *B.S., U.S. Naval Academy; B.S.M.E., U.S. Naval Postgraduate School.*
- Commander Robert R. Goldner, USN; *B.S., U.S. Naval Academy; B.S.Ae.E., U.S. Naval Postgraduate School; M.S.Ae.E., Massachusetts Institute of Technology.*
- Lieutenant Commander Richard E. Goodspeed, USN; *B.S., U.S. Naval Academy; M.E.Ae.E., Princeton University.*
- Associate Professor Robert A. Granger, II; *B.A., Pomona College; M.S., Drexel Institute of Technology.*
- Major James R. Groves, USA; *B.S.C.E., Texas A&M College; M.S., Massachusetts Institute of Technology.*
- Lieutenant Thomas W. Habermas, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Ronald S. Hadbavny, CEC, USN; *B.S., M.S., University of Notre Dame.*
- Lieutenant David R. Hand, USN; *B.S., U.S. Naval Academy; B.S. Ae.E., U.S. Naval Postgraduate School.*
- Lieutenant Commander Charles P. Hary, USN; *B.S., U.S. Naval Academy; M.S.M.E., U.S. Naval Postgraduate School.*
- Associate Professor Charles O. Heller; *B.S., M.S., Oklahoma State University; Ph.D., The Catholic University of America; P.E.*
- Associate Professor Richard A. Hirsch; *B.S.Ae.E., Rensselaer Polytechnic Institute; M.S., Brown University.*
- Assistant Professor William B. Huckenpoehler, Jr.; *B.S., U.S. Naval Academy; M.N.E., Catholic University of America.*
- Associate Professor Bruce Johnson; *B.S.M.E., Iowa State University; M.S.M.E., Ph. D., Purdue University.*
- Professor Robert M. Johnston; *B.S., Pennsylvania State University; M.S.M.E., Virginia Polytechnic Institute.*
- Lieutenant Commander James V. Jolliff, USN; *B.S., U.S. Naval Academy; M.S.Nav. Arch., Webb Institute of Naval Architecture.*
- Professor Milan K. Jovanovic; *Dipl. Ing., Dipl.Phys., University of Belgrade; M.S., Ph. D., Northwestern University.*
- Assistant Professor Harry H. Keith, Jr.; *S.M.Mech.Engr., Sc.D., Massachusetts Institute of Technology.*
- Lieutenant Commander Roy A. Kelley, USN; *B.S., U.S. Naval Academy; M.S.E.E., U. S. Naval Postgraduate School.*
- Lieutenant Commander Jacob D. Kertz, USN; *B.S.M.E., University of Idaho; M.S.Ae.E., U.S. Naval Postgraduate School; M.S.Pers. Admin., The George Washington University.*
- Lieutenant Commander Edward R. Kuhn, USN; *B.S., University of Bridgeport; B.S., U.S. Naval Postgraduate School.*
- Associate Professor Robert F. Latham; *B.S., U.S. Naval Academy; M.A., University of Maryland.*



Captain Charles S. Lee, USAF; *B.S., University of Pennsylvania; M.S., University of Arizona.*

Associate Professor William M. Lee; *B.S.M.E., M.S.M.E., University of Pittsburgh; P.E.*

Professor Vincent J. Lopardo; *B.S., M.S., University of Pittsburgh; Ph.D., Catholic University of America; P.E.*

Associate Professor John E. Losure; *B.S., U.S. Naval Academy; M.S., Purdue University.*

Lieutenant Commander Richard A. Lowery, CEC, USN; *B.A., B.S., Columbia University; M.S.M.E., Rensselaer Polytechnic Institute.*

Commander Donald W. Mathews, USN; *B.S.C.E., University of California; Aero Eng.; (Ae.E.), Stanford University; B.S., U.S. Naval Postgraduate School; U.S. Armed Forces Staff College.*

Lieutenant Leon R. Miller, USN; *B.S., Wisconsin State University; B.S.Ae.E., U.S. Naval Postgraduate School.*

Commander James W. Organ, USN; *B.S., U.S. Naval Academy; B.S.E.E., U.S. Naval Postgraduate School; M.E.A., The George Washington University.*

Lieutenant David F. Pilmer, USN; *B.S.Chem.Eng., Stanford University.*

Commander James B. Poland, USN; *B.S., U.S. Naval Academy; B.S. Ae.E., U.S. Naval Postgraduate School.*

Associate Professor Andrew A. Pouring; *B.M.E., M.M.E., Rensselaer Polytechnic Institute; Ph. D., Yale University.*

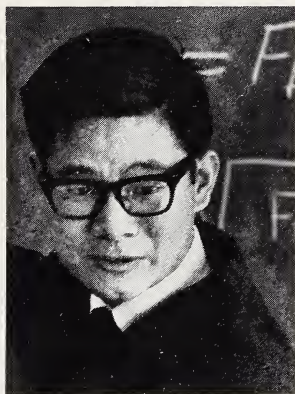
Associate Professor Bruce H. Rankin; *B.S., U.S. Naval Academy; M.S.M.E., University of Connecticut; Ph.D., Catholic University of America.*

Assistant Professor Kenneth F. Read;

*B.M.E., Georgia Institute of Technology; M.M.E., Catholic University of America.*

Lieutenant Commander David B. Reynolds, USN; *B.S., U.S. Naval Academy; M.S.M.E., U.S. Naval Postgraduate School.*

Lieutenant Commander Hollis E. Robertson, USN; *B.S., U.S. Naval Academy; B.S.M.E., U.S. Naval Postgraduate School.*



Asst. Prof. Wu

Associate Professor David F. Rogers; *B.Ae.E., M.S.Ae.E., Ph.D.Ae.E. and Astronautics, Rensselaer Polytechnic Institute.*

Commander Reginald C. Rowley, USN; *B.S., U.S. Naval Academy; M.S.M.E., San Diego State College.*

Assistant Professor William H. Schulden; *B.S., U.S. Naval Academy M.N.E. Catholic University of America.*

Associate Professor Francis L. Smith, Jr.; *B.S.M.E., M.S.E., University of Florida; P.E.*

Lieutenant Commander Markham D. Tuft, USN; *B.S., University of California; M.S.M.E., San Diego State College.*

Associate Professor John P. Uldrick;  
*B.C.E., B.M.E., M.S.M.E., Clemson  
University; Ph. D., University of  
Florida; P.E.*

Associate Professor Vadym V. Utgoff;  
*B.S., U.S. Naval Academy; B.S.,  
U.S. Naval Postgraduate School;  
M.S., Massachusetts Institute of  
Technology.*

Associate Professor Paul R. Mater,  
Jr.; *B.S., U.S. Naval Academy;  
M.S.E., University of Michigan.*

Lieutenant (j.g.) Donald L. Wehe,  
USNR; *B.S., University of Cali-  
fornia; M.S.Nuc.Eng., Stanford  
University.*

Lieutenant Commander Bradford W.  
Welles, USN; *B.S., U.S. Naval  
Academy; B.S.Ae.E., U.S. Naval  
Postgraduate School.*

Associate Professor Robert W. Werl-  
was; *B.S., M.S., Pennsylvania State*

*University; Ph.D., Virginia Poly-  
technic Institute.*

Assistant Professor Peter F. Wiggins;  
*B.Mar.E., State University of New  
York Maritime College; M.M.E.,  
New York University; P.E.*

Lieutenant Commander Bruce A.  
Wilcox, USN; *B.S., U.S. Naval  
Academy; M.S.Ae.E., U.S. Naval  
Postgraduate School.*

Lieutenant Commander James K.  
Williams, Jr., USN; *B.S., Wofford  
College; Ph. D., University of  
Southern California.*

Major John M. Willmarth, USMC;  
*B.S., U.S. Naval Academy; B.S.  
Ae.E., U.S. Naval Postgraduate  
School.*

Assistant<sup>o</sup> Professor Chih Wu; *B.S.  
M.E., Cheng Kung University;  
Ph. D., University of Illinois.*

## ENGLISH, HISTORY, AND GOVERNMENT DEPARTMENT

**Head of Department:** Captain Harry A. Cummings, USN; B.S., U.S. Naval Academy; M.A., The George Washington University; National War College.

**Executive Officer:** Commander Richard H. Wilson, USN; B.S., U.S. Naval Academy; M.S., The George Washington University; U.S. Naval War College.

**Senior Professor:** Professor William W. Jeffries; A.B., Birmingham-Southern College; M.A., Ph.D., Vanderbilt University.

### *Departmental Staff:*

Lieutenant (j.g.) Donald R. Adams,  
USNR; *B.A., University of Pitts-  
burgh; M.A., Ph. D., University of  
Pennsylvania.*

Professor Henry H. Adams; *B.A.,  
University of Michigan; M.A.,  
Ph. D., Columbia University.*

Major Constantine Albans, USMC;  
*A.B., University of Massachusetts;*

*M.A., The Johns Hopkins Univer-  
sity.*

Associate Professor James A. Arnold;  
*B.A., M.A., Ph. D., Princeton Uni-  
versity.*

Assistant Professor George Pope At-  
kins; *B.A., University of Texas;  
M.A., Ph. D., American University.*

Assistant Professor Angelos C. Ballas;

*B.S., M.A., New York University.*

Associate Professor Haney H. Bell, Jr.; *B.A., Randolph-Macon College; M.A., University of Maryland.*

Professor William M. Belote; *B.A., M.A., University of Washington; Ph. D., University of California (Berkeley).*

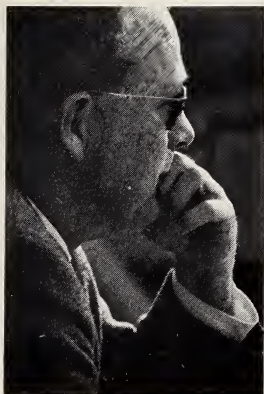
Associate Professor Robert A. Bender; *B.A., M.A., Princeton University.*

*B.A., Emory University.*

Professor Thomas P. Carpenter; *B.A., Clark University; M.A., Ph. D., Stanford University.*

Associate Professor Ellery H. Clark, Jr.; *B.A., Harvard College; M.A., Boston University.*

Assistant Professor Charles L. Cochran; *B.S., Mount Saint Mary's College; M.A., Niagara University.*



Assoc. Prof. Darden



Prof. Carpenter



Lt. Cdr. Powers

Lieutenant (j.g.) Jerry W. Bliley, SC, USN; *B.S., M.B.A., Ohio State University.*

Associate Professor John P. Boatman; *B.A., Brothers College of Drew University; M.A., Peabody College.*

Associate Professor Thomas Boyajy; *B.A., American International College; M.A., Hartford Seminary Foundation.*

Assistant Professor Ronald Broude; *A.B., M.A., Ph. D., Columbia University.*

Associate Professor William L. Caldehead; *B.A., M.A., Ph. D., University of Pennsylvania.*

Lieutenant John A. Camp, USNR;

Professor Paolo E. Coletta; *B.S., M.A., Ph. D., University of Missouri.*

Assistant Professor James F. Collins; *A.B., Harvard College; M.A. Indiana University.*

Associate Professor Charles L. Crane, Jr.; *B.A., Davidson College; M.A., University of North Carolina.*

Professor Robert W. Daly; *Ph. B., M.A., Loyola College; Ph. D., Chicago University.*

Associate Professor William M. Darden; *A.B., M.A., University of North Carolina.*

Lieutenant Dan A. Davis, USN; *B.S., Memphis State University.*

Assistant Professor Eldridge B. Duf-



- fee; *B.A., M.A., University of Maryland.*
- Assistant Professor James H. Dukes; *B.S., Georgia Institute of Technology; M.A., Emory University.*
- Assistant Professor Henry C. Durham, Jr.; *B.A., San Diego State College; M.A., Ph. D., University of Munich.*
- Lieutenant Robert G. Farina, USNR; *B.A., Harvard University; M.A., University of California.*
- Assistant Professor John A. Fitzgerald; *B.A., Whitman College; M.A., University of Chicago.*
- Lieutenant Philip D. Flynn, USNR; *A.B., Loyola College; M.A., University of Pennsylvania.*
- Professor J. Robert Fredland; *B.A., Bates College; M.A., Princeton University; Ph. D., American University.*
- Assistant Professor John T. French; *B.A., St. Vincent College; M.A., The Johns Hopkins University.*
- Ensign Donald C. Fuller, USNR; *A.B., M.A., University of Georgia.*
- Foreign Service Officer-3 Dirk Gleysteen (State Department); *B.A., Yale University.*
- Lieutenant (j.g.) John C. Golembe, USNR; *A.B., Columbia University; M.A., Teachers College of Columbia University.*
- Ensign Ernest W. Gosnell, Jr., USNR; *B.A., The University of the South; M.A., Fletcher School of Law and Diplomacy.*
- Professor Edwin M. Hall; *B.A., Williams College; M.A., Chicago University; Ph. D., Pennsylvania University.*
- Lieutenant Henry L. Harder, USNR; *B.A., Subiaco College; M.A., University of Arkansas.*
- Professor Wilson L. Heflin; *A.B., Birmingham-Southern College; M.A., Ph. D., Vanderbilt University.*
- Associate Professor John W. Huston; *A.B., Monmouth College; M.A., Ph. D., University of Pittsburgh.*
- Associate Professor Michael Jasper-son; *B.A., University of Virginia; M.A., Ph. D., Georgetown University.*
- Lieutenant Commander Richard E. Johe, USN; *B.A., Dickinson College; M.A., University of Idaho.*
- Assistant Professor Kenneth J. Kerin; *B.A., M.A., University of Connecticut.*
- Professor Neville T. Kirk; *B.A., Columbia College; M.A., Columbia University.*
- Assistant Professor Robert E. Knight; *A.B., Yale University; M.A., Harvard University.*
- Major Raymond M. Kostesky, USMC; *B.S., U.S. Naval Academy.*
- Professor Douglas R. Lacey; *A.B., Illinois College; M.A., Rutgers University; Ph. D., Columbia University.*
- Professor Winston B. Lewis; *A.B., Amherst College; M.A., Ph. D., Harvard University.*
- Assistant Professor Philip A. Mangano; *B.A., Yale University; M.A., Rochester University; LL.B., George Washington University.*
- Professor Elmer J. Mahoney; *A.B., Western Maryland College; LL.B., University of Maryland Law School.*
- Assistant Professor Philip R. Marshall; *B.A., Yale University; M.A., University of Pittsburgh; Ph. D., University of Pennsylvania.*
- Professor Robert L. Mason; *B.S., Middle Tennessee State College; M.A., Ph. D., George Peabody College for Teachers.*
- Associate Professor Richard Megar-

gee; *A.B., Princeton University; M.A., Ph. D., Northwestern University.*

Visiting Lecturer Richard A. Mikaliunas; *B.S., M.S., Georgia Institute of Technology; M.A., American University.*

Assistant Professor Clair E. Morris, Jr.; *B.S., M.S., North Carolina State University; M.S., University of Wisconsin.*

Lieutenant William S. Norman, USN; *B.S., West Virginia Wesleyan College; M.A., American University.*

Professor Rocco M. Paone; *A.B., A.M., Fordham University; Ph. D., Georgetown University.*

Professor A. Stuart Pitt; *B.A., M.A., Ph. D., Yale University.*

Associate Professor James T. Pole; *B.A., Lafayette College; M.A., Columbia University.*

Lieutenant (j.g.) Alan R. Posner, USNR; *A.B., University of Rochester; M.I.A., Columbia University.*

Professor Elmer B. Potter; *B.A., University of Richmond; M.A., University of Chicago.*

Lieutenant Commander Thomas E. Powers, USNR; *B.S.S., Loyola University; M.A., DePaul University; Ph. D., University of Chicago.*

Professor John R. Probert; *A.B., M.A., Lafayette University; Ph. D., University of Pennsylvania.*

Professor John C. Reed; *A.B., Brown University; B. Litt., Oxford (Merton).*

Lieutenant (j.g.) George W. Reiger, USNR; *B.A., Princeton University; M.A., Columbia University.*

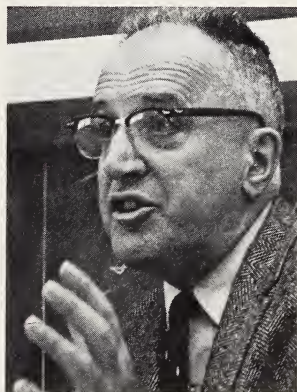
Lieutenant (j.g.) Thomas G. Rhoad, USNR; *B.A., Dartmouth College.*

Associate Professor Arthur A. Richmond, III; *B.A., Williams College; M.A., Ph. D., Yale University.*

Associate Professor Alan M. Rose; *A.B., Johns Hopkins University; A.M., Ph. D., Columbia University.*

Associate Professor William H. Russell; *A.B., Harverford College; M.A., Harvard University.*

Lieutenant (j.g.) Donald T. Siebert, USNR; *B.A., M.A., University of Oklahoma.*



Assoc. Prof. Boyajy

Lieutenant (j.g.) Eugene P. Sullivan, SC, USNR; *B.A., Manhattan College; M.A., University of Notre Dame.*

Assistant Professor James P. Thomas, Jr.; *B.A., Yale University; M.A., The Johns Hopkins University.*

Assistant Professor Philip W. Warken; *A.B., Capital University; M.A., Ohio State University.*

Lieutenant (j.g.) Joseph B. Wharton, III, SC, USNR; *B.S., Lafayette College; M.B.A., Harvard Business School.*

Associate Professor A. Royall Whitaker; *A.B., Ph. D., University of Pennsylvania.*

Associate Professor Rowan A. Wil-

liams; *A.B., Princeton University; M.A., Ph. D., University of Pennsylvania.*

Assistant Professor Larman C. Wilson; *A.B., Nebraska State University; M.A., Ph. D., University of Maryland.*

Associate Professor H. Alan Wycherley; *B.A., M.A., University of Pennsylvania.*

Associate Professor John N. Wysong; *B.A., University of Oregon; M.A., University of California; Ph. D., University of Innsbruck.*

## MATHEMATICS DEPARTMENT

**Head of Department:** Captain John W. Johnston, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School; M.S. (A.E.), Massachusetts Institute of Technology.

**Executive Officer:** Commander Abram B. Snively, III, USN; B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.

**Senior Professor:** Professor Livingston H. Chambers, A.B., A.M., West Virginia University; Ph.D., Cornell University.

### *Departmental Staff:*

Professor James C. Abbott; *B.S., A.M., Harvard University; Ph. D., University of Notre Dame.*

Lieutenant Commander William A. Arata, III, USN; *B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.*

Lieutenant Raymond W. Atcheson, USNR; *B.S., Farleigh Dickenson University; M.A., Montclair State College.*

Professor Richard P. Bailey; *A.B., A.M., Ph. D., University of Pennsylvania.*

Professor N. Hansen Ball; *B.S., Ph. D., Massachusetts Institute of Technology.*

Lieutenant William B. Barton, USNR; *B.S., Illinois College; M.S., Illinois State University.*

Professor Theodore J. Benac, *B.S., St. Michael's College; M.S. University of Connecticut; Ph. D., Yale University.*

Professor Ebon E. Betz; *A.B., Albion*

*College; A.M., University of Michigan; Ph. D., University of Pennsylvania.*

Professor James R. Bland; *Sc. B., Brown University.*

Professor Carroll P. Brady; *A.B., A.M., University of California at Los Angeles; Ph. D., University of Chicago.*

Associate Professor Burnhill H. Buikstra; *B.S., M.S., Kansas State College.*

Assistant Professor Harry B. Coonce; *B.S., Iowa State University.*

Lieutenant (j.g.) Calvin O. Cotey, USNR; *B.A., Vanderbilt University.*

Assistant Professor George E. Culbertson; *B.S., M.S., Virginia Polytechnic Institute.*

Lieutenant Commander Leo P. Cucias, USN; *B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.*

Professor Albert E. Currier; *S.B., A.M., Ph. D., Harvard University.*



Lieutenant (j.g.) Charles S. Davis, USNR; *B.S., M.S., University of South Carolina.*

Lieutenant Thomas F. Degnan, USN; *B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.*

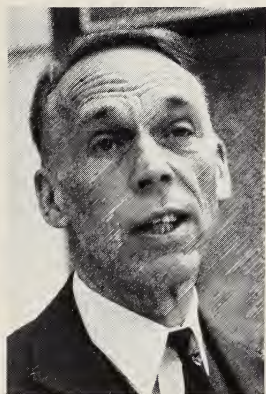
Lieutenant Commander John J. Ditrack, USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*

*B.A., M.A., University of California of Los Angeles.*

Associate Professor Edwin C. Gras; *A.B., A.M., Harvard University.*

Lieutenant (j.g.) David R. Gregory, USNR; *B.A., M.A., Wayne State University.*

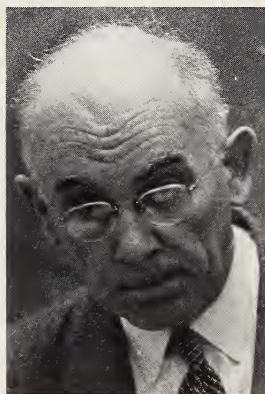
Assistant Professor George E. Haborak, *A.B., M.A., Boston College; M.A., Wayne State University.*



*Prof. Ball*



*Asst. Prof. Haborak*



*Prof. Sears*

Assistant Professor John P. Edwards, Jr., *B.A., Furnham University; M.A., Vanderbilt University.*

Lieutenant Charles W. Ehler, USN; *B.S., University of Missouri; M.S., U.S. Naval Postgraduate School.*

Assistant Professor Larry E. Ewing; *B.S., Franklin and Marshall College; M.S., Pennsylvania State University.*

Lieutenant Daniel Fecko, USNR; *B.S., Waynesburg College; M.S., University of Pittsburgh.*

Ensign Lawrence J. Fransen, USNR; *B.S., Wheaton College.*

Associate Professor Milo V. Gibbons; *B.S., Guilford College; M.A., University of Maryland.*

Associate Professor John R. Gorman;

Lieutenant John L. Hammer, III, USN; *B.S., U.S. Naval Academy;*

Professor Ernest Hawkins; *B.A., M.A., Wesleyan University.*

Captain John H. Helm, USMC; *B.A., Youngstown University.*

Assistant Professor Wilbur J. Hildebrand; *B.S., Shippensburg State College; M.A.T., Indiana University.*

Professor Justus M. Holme; *B.S., University of Pennsylvania; M.S., Lehigh University; C.E., University of Pennsylvania; P.E.*

Lieutenant (j.g.) Richard A. Ilka, USNR; *B.S., Wayne State University.*

Associate Professor John W. Jayne, *A.B., M.A., Vanderbilt University; M.S., Ph. D., Georgia Tech.*

- Professor Morris L. Kales, *B.S., M.S., Massachusetts Institute of Technology; Ph. D., Brown University.*
- Associate Professor Harold M. Kaplan; *B.S., Massachusetts Institute of Technology; M.A., Princeton University; Ph. D., University of Maryland.*
- Associate Professor Arthur A. Karwath; *B.S., St. Ambrose College; M.S., Iowa State College.*
- Commander William F. Kelley, USN; *B.S., University of New Mexico; B.S., U.S. Naval Postgraduate School.*
- Associate Professor Herbert L. Kinsolving; *B.S., Yale University; M.A., Harvard University.*
- Lieutenant (j.g.) Robert N. Leggett, Jr., USNR; *B.A., Millsaps College.*
- Assistant Professor Scott W. Mansour; *B.S., M.S., University of Michigan.*
- Lieutenant (j.g.) Richard F. Maruszewski, USNR; *B.S., M.S., Marquette University.*
- Assistant Professor David C. Mayne; *B.A., The College of Wooster; M.A., Miami University.*
- Lieutenant Commander Richard A. McConnell, USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Michael H. Merrill, USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*
- Professor Joseph Milkman; *B.S., M.A., Brooklyn College; Ph. D., New York University.*
- Associate Professor John F. Milos; *A.B., Dartmouth College; A.M., Columbia University.*
- Associate Professor Richard Molloy; *B.S., Loyola College; M.A., The Johns Hopkins University; M.B.A., Stanford University.*
- Assistant Professor James G. Monika; *A.B., A.M., St. Louis University.*
- Assistant Professor C. Edward Moore; *B.A., M.A., University of Delaware; M.A., University of Pennsylvania.*
- Professor Richard C. Morrow; *A.B., M.A., Washington and Jefferson College.*
- Lieutenant Ronald D. Newmister, USNR; *B.S., Illinois Wesleyan University; M.S., U.S. Naval Postgraduate School.*
- Assistant Professor Charles R. Nicolaysen; *B.S., Bradley University; M.A., University of Kansas.*
- Associate Professor Nathan O. Niles; *B.S., M.S., The St. Lawrence University.*
- Assistant Professor Robert A. O'Brien, Jr., *B.S., Purdue University; M.S., New York University.*
- Assistant Professor Daniel J. Palmer; *B.S., University of Notre Dame; Ph. D., University of Maryland.*
- Assistant Professor L. Bruce Palmer; *A.B., M.S., San Diego State College.*
- Professor Kenneth L. Palmquist; *A.B., Bethany College; A.M., University of Missouri; Ph.D., University of Kentucky.*
- Professor Joseph F. Paydon; *B.A., North Central College; M.A., Ph. D., Northwestern University.*
- Lieutenant Commander Henry F. Rempt, Jr., USN; *B.S., U.S. Naval Academy.*
- Professor Virgil N. Robinson; *A.B., M.A., Vanderbilt University; Ph. D., University of Chicago.*
- Professor Samuel S. Saslaw; *B.S., M.S., Ph. D., Massachusetts Institute of Technology.*
- Lieutenant Charles L. Robertson, USN; *B.S., Mississippi State University; M.S., U.S. Naval Postgraduate School.*

Assistant Professor George E. Schilling; *B.S., Monmouth College; M.A., University of Maine.*

Professor Walton H. Sears, Jr., *A.B., Harvard University; M.A., University of Vermont; M.A., Harvard University.*

Professor Harold K. Sohl; *A.B., Ph. D., The Johns Hopkins University.*

Associate Professor Mahlon F. Stilwell; *B.S., Hamilton College; A.M., Syracuse University.*

Associate Professor William J. Strange; *A.B., Park College; M.A., Syracuse University.*

Professor G. Ralph Strohl, Jr., *B.A., Haverford College; M.A., University of Pennsylvania; Ph. D., University of Maryland.*

Associate Professor Earl G. Swafford; *B.A., Miami University; A.M., Syracuse University.*

Associate Professor Orville M. Thomas; *B. Ed., State Teachers College, Winona, Minn.; M.A., State College of Education, Greeley, Colorado.*

Associate Professor Clarence E. Thompson; *B.S., Geneva College; M.A., Duke University.*

Commander James R. Throop, USN; *B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.*

Professor John A. Tierney, *B.E., Central Connecticut State College; M.S., Columbia University; Ph. D., University of Maryland.*

Associate Professor John H. White; *A.B., Princeton University; M.A., Columbia University.*

Associate Professor Harold Wierenga; *B.S., M.S., Kansas State College.*

Associate Professor Carvel S. Wolfe, *B.S., M.S., University of Arizona.*

## MODERN LANGUAGES DEPARTMENT

**Head of Department:** Captain Kenneth G. Haynes, USN; *B.S., University of Texas; M.A., The George Washington University; U.S. Naval Postgraduate School; U.S. Naval War College.*

**Executive Officer:** Commander George D. Florence, USN; *B.S., U.S. Naval Academy; M.A., The George Washington, University.*

**Senior Professor:** John D. Yarbro; *A.B., University of Kentucky; M.A., Columbia University.*

### *Departmental Staff:*

Professor William H. Berry; *B.A., University of Richmond; M.A., Columbia University.*

Associate Professor William H. Bufum; *B.A., M.A., Princeton University.*

Assistant Professor Francis J. Dannerbeck; *A.B., M.A.T., Indiana University; Ph. D., Purdue University.*

Lieutenant Robert D. de la Garza, USNR; *Colombian Naval Academy.*

Associate Professor Ernest A. DeRosa; *B.A., M.A., Montclair State College; M.A., Middlebury College.*

Professor Henry W. Drexel; *B.A., Amherst College; M.A., Columbia University.*

Professor James H. Elsdon; *B.A., Uni-*



versity of Minnesota; M.A., Ph. D.,  
University of California (Berkeley).

Professor Rodger A. Farley; B.A.,  
M.A., Washington University;  
Ph. D., Florida State University.

Lieutenant Commander Gianandrea  
Fazio, Italian Navy; Italian Naval  
Academy.

Lieutenant Commander Ivan Fleuriot  
de Langle, French Navy; L'Ecole  
Navale (France).

Fletcher School of Law & Diplo-  
macy; Ph. D., American University.

American Professor Harry R. Keller,  
Jr.; B.A., University of Cincinnati;  
M.A., (Russian), Middlebury Col-  
lege; M.A. (Romance Languages),  
Princeton University; LL.B., Uni-  
versity of Maryland.

Assistant Professor George H. Koenig;  
B.A., M.A., Middlebury College.

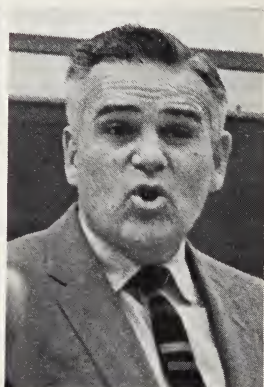
Associate Professor Kendall E. Lap-



Lt. Cdr. Fazio  
Italian Navy



Asst. Prof. Tolstoy



Prof. Griffiths

Lieutenant Louis R. Greig, USNR;  
B.A., University of Southwestern  
Louisiana.

Professor John E. Griffiths; B.A., La-  
fayette College; M.A. (Spanish),  
M.A. (French), Middlebury College.

Instructor Michael E. Grivsky; B.S.,  
Georgetown University.

Lieutenant Commander William F.  
Hardin, USN; B.A., Duke Univer-  
sity; M.A., Middlebury College.

Professor Alden R. Hefler; B.A., Dart-  
mouth College; M.A., Harvard  
University; Ph. D., University of  
Wisconsin.

Associate Professor John A. Hutchins;  
B.A., Allegheny College; M.A.,

pin; B.A., DePaw University; M.A.  
(French), M.A. (Russian), Middle-  
bury College.

Professor Claude P. Lemieux; B.A.,  
Louisiana State University; M.A.,  
Middlebury College.

Associate Professor Charles R. Mi-  
chaud; B.A., University of Illinois;  
M.A., Northwestern University.

Professor Rene F. Muller; B.A., M.A.,  
Columbia University.

Lieutenant (j.g.) Hans K. Mussler,  
USNR; B.A., Brigham Young Uni-  
versity; M.A., Yale University.

Associate Professor Clarence A. Prit-  
chard; B.A., M.A., (French); M.A.  
(Spanish), Middlebury College.

Professor Guy J. Riccio; *B.A., Queens College; M.A., University of Wisconsin; Ph. D., University of Maryland.*

Associate Professor Kurt P. Roderbourg; *M.A., Harvard University.*

Associate Professor Edward J. Satterthwaite; *B.A., M.A., University of California (Berkeley).*

Lieutenant Commander Ivan S. Serpa, Brazilian Navy; *B.S., Escola Naval (Brazil).*

Associate Professor Wesley W. Sewell; *A.B., Florida Southern College; M.A., Middlebury College.*

Assistant Professor Vladimir S. Tolstoy; *B.A., Hobart College; M.A., Georgetown University; Licencié en Théologie, Institut de Théologie Orthodoxe de Paris.*

Lieutenant Michael F. Treacy, USN; *B.S., U.S. Naval Academy.*

Assistant Professor Remo J. Trivelli; *B.A., St. Peter's College; M.A., Middlebury College.*

Lieutenant Commander Miguel Viveros, Mexican Navy; *Mexican Naval Academy.*

Lieutenant Commander Christoph von Criegern, Federal German Navy; *German Naval Academy.*

## NAVAL SCIENCE DEPARTMENT

**Head of Department:** Captain William C. Nicklas, USN; *B.S., U.S. Naval Academy; U.S. Naval War College.*

**Executive Officer:** Commander Monchie M. Gunter, Jr., USN; *B.A., University of Mississippi; U.S. Naval Postgraduate School; Armed Forces Staff College.*

**Senior Professor:** Gregory J. Mann; *B.S., M.A., Loyola University; Ed.D., University of Maryland.*

### *Departmental Staff:*

Commander Curtis O. Anderson, USN; *B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.*

Lieutenant Commander Marion A. Atwell, USN; *B.A., The George Washington University.*

Lieutenant Stanley J. Bailey, Jr., USN; *B.S., U.S. Naval Academy; U.S. Naval Postgraduate School.*

Lieutenant William J. Bakula, Jr., USN; *B.S., St. Louis University; M.B.A., The George Washington University.*

Lieutenant James E. Barker, USN;

*B.A., Westminster College.*

Lieutenant Colonel Don D. Beal, USMC; *B.S., Sam Houston State College; M.B.A., The George Washington University.*

Lieutenant (j.g.) Robert S. Bell, USN; *B.S., U.S. Naval Academy.*

Lieutenant Norman R. Blinn, USNR; *B.S., Lewis College.*

Assistant Professor Richard C. Boys; *B.S., U.S. Military Academy; M.A., University of Kentucky.*

Lieutenant Peter A. Browne, USN; *B.S., U.S. Naval Academy.*

Lieutenant Desmond T. Coffee, USN;

- B.A., University of Santa Clara; M.A., American University.*
- Lieutenant Jerry A. Cooper, USN; *B.S., U.S. Naval Academy; M.B.A., Harvard Business School.*
- Lieutenant Michael T. Corgan, USN; *B.S., U.S. Naval Academy.*
- Commander William F. Cross, USN; *B.S., B.A., Central Washington College; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Ralph F. DeWalt, USN; *B.S., Moravian College; M.S., U.S. Naval Postgraduate School.*
- Commander James F. Donovan, USN; *B.A., Colgate University; M.A., U.S. Naval Postgraduate School.*
- Major George J. Ertlmeier, USMC; *B.S., U.S. Naval Academy.*
- Lieutenant Robert L. Farnan, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Commander Louis H. Fislcr, USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*
- Commander John F. Foster, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Roger A. Garrett, USN; *B.S., South Dakota State University; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Robert E. Gasser, USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Commander Stanley R. Golanka, USN; *B.S., Purdue University; M.S., U.S. Naval Postgraduate School.*
- Lieutenant (j.g.) Hardy P. Graham, USNR; *B.A., M.A., University of Mississippi.*
- Lieutenant Commander Leonard B. Greene, USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Thomas C. Grzymala, USN; *B.S., U.S. Naval Academy.*
- Lieutenant Commander "S" Portland Halle, III, USN; *B.A., Stanford University; M.S., U.S. Naval Postgraduate School.*
- Assistant Professor Glyde B. Hannah; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School; M.S., University of Illinois.*
- Captain Christian L. Harkness, USMC; *B.A., Virginia Military Institute.*
- Lieutenant Carl E. Harris, Jr., USN; *B.S., U.S. Naval Academy; M.S., The George Washington University.*
- Lieutenant Michael J. Hart, USN; *B.S., M.S., Iowa State University.*
- Associate Professor Charles N. G. Hendrix; *B.S., U.S. Naval Academy; M.A., University of California.*
- Professor Roy Herrmann; *B.S., College Francais, Berlin Germany; Ph. D., Freidrich Franz Universität, Rostock, Germany.*
- Lieutenant Commander John J. Higginson, USN; *B.A., St. Mary's University; B.S., U.S. Naval Postgraduate School; M.S., The George Washington University.*
- Lieutenant Commander Elmer E. Inman, MSC, USN; *B.A., University of California, Los Angeles; M.A., Occidental College; Ph. D., Claremont Graduate School and University Center.*
- Lieutenant Robert T. Isaacson, USN; *B.S., University of Oregon; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Commander Robert D. Kelley, USN; *B.S., Ohio University; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Commander John F. Keith, USN; *B.A., American International College; M.S., University of Massachusetts.*
- Assistant Professor Robert S. Kilcourse; *B.S., U.S. Naval Postgrad-*



uate School; M.S., Ed.D., Florida State University.

Lieutenant David W. Lamott, USN; B.A., Pomona College; M.S., The George Washington University.

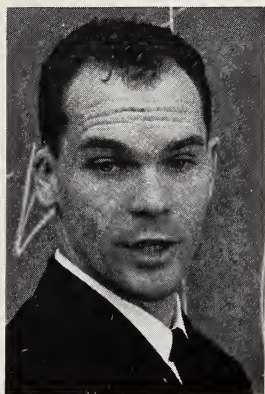
Assistant Professor Clement T. Latimer; B.S., U.S. Naval Academy; M.S., The George Washington University.

Lieutenant David S. Lebby, USNR;

Lieutenant Commander Robert R. McArthur, USN; B.S., Colorado A & M College; B.S., U.S. Naval Postgraduate School.

Lieutenant Larry D. McCullough, USN; B.S., U.S. Naval Academy.

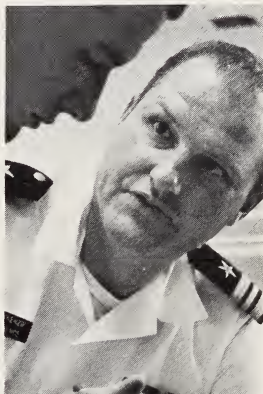
Lieutenant Commander Donald A. McGuiness, USN; B.S., Northeastern University; B.S., U.S. Naval Postgraduate School.



Lt. Hart



Asst. Prof. Tate



Lt. Cdr. Mackenzie

B.A., M.A., University of Pennsylvania.

Lieutenant Commander "J" Phillip London, USN; B.S., U.S. Naval Academy, M.S., U.S. Naval Postgraduate School.

Lieutenant Commander Joseph D. Mackenzie, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Commander John J. MacPherson, USN; B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.

Lieutenant John C. Maheu, USN; B.S., U.S. Naval Academy.

Lieutenant James A. Maxwell, USNR; B.A., Middle Tennessee State University.

Lieutenant Thomas M. McNicholas, Jr., USN; B.S., U.S. Naval Academy; M.S., Rensselaer Polytechnic Institute.

Lieutenant (j.g.) John H. Minan, USNR; B.S., University of Louisville; M.B.A., University of Kentucky.

Assistant Professor Karel Montor; B.S., University of Illinois; M.B.A., Fairleigh Dickenson University.

Lieutenant Commander Anthony Morano, USN; B.A., Saint Mary's College; M.S., U.S. Naval Postgraduate School.

Lieutenant Commander John F. Neish, USN; B.S., U.S. Naval Academy.

Lieutenant Geoffrey A. Nelson, USN;  
*B.S., U.S. Naval Academy.*

Lieutenant Gerald A. Nelson, USN;  
*B.S., U.S. Naval Academy.*

Lieutenant Commander Michael G.  
O'Connor, II, USN; *B.S., U.S.  
Naval Academy; M.S., U.S. Naval  
Postgraduate School.*

Lieutenant (j.g.) Preston E. Porter,  
USNR; *A.B., University of Cali-  
fornia; M.S., Humbolt State Col-  
lege.*

Lieutenant (j.g.) Russell G. Porter,  
USNR; *A.B., University of Cali-  
fornia; M.S., Humbolt State Col-  
lege.*

Commander Arthur M. Potter, Jr.,  
USN; *B.S., U.S. Naval Academy.*

Associate Professor Robert F. Powell;  
*B.S., Yale University; M.S., Cornell  
University.*

Lieutenant (j.g.) Warren T. Rayder,  
USNR; *B.A., Valparaiso Univer-  
sity.*

Lieutenant John H. Reed, USN; *B.S.,  
University of North Carolina.*

Lieutenant Colonel Charles D. Rob-  
erts, Jr., USMC; *B.S., University of  
Missouri; M.B.A., The George  
Washington University.*

Lieutenant William J. Rodriguez,  
USN; *B.S., City College of New  
York; M.S., U.S. Naval Postgradu-  
ate School.*

Lieutenant F. Patrick Roll, USN;  
*B.S., Canisius College.*

Lieutenant Commander James C.  
Rydzewski, USN; *B.S., University  
of Wisconsin; M.S., U.S. Naval  
Postgraduate School.*

Lieutenant John B. Sharp, Jr., USN;  
*B.S., U.S. Naval Academy; B.S.,  
U.S. Naval Postgraduate School.*

Commander Edward A. Short, USN;  
*B.S., Tulane University; M.S., U.S.  
Naval Postgraduate School.*

Lieutenant (j.g.) Thomas L. Sopwith,  
USNR; *B.A., M.B.A., University of  
Oregon.*

Captain Christopher W. J. Stanat,  
USMC; *B.S., U.S. Military Acad-  
emy.*

Lieutenant Philip M. Tansey, USN;  
*B.S., U.S. Naval Academy.*

Assistant Professor Norman L. Tate;  
*B.S., U.S. Naval Academy; B.S.,  
U.S. Naval Postgraduate School;  
M.S., The George Washington  
University.*

Commander George I. Thompson,  
USN; *B.A., University of Cali-  
fornia; M.A., The George Wash-  
ington University.*

Associate Professor Eugene D. Tra-  
ganza; *B.A., Indiana University;  
M.S., Texas A & M University;  
Ph. D., University of Miami.*

Lieutenant Joseph Tranchini, USN;  
*B.S., U.S. Naval Academy; B.S.,  
U.S. Naval Postgraduate School.*

Lieutenant Jesus B. Tupaz, USN;  
*B.S. U.S. Naval Academy; M.S.,  
U.S. Naval Postgraduate School.*

Commander William C. Uelman,  
USN; *B.S., U.S. Naval Postgradu-  
ate School; M.B.A., The George  
Washington University.*

Lieutenant Commander James G.  
Vaiana, USN; *B.S., Loyola Uni-  
versity.*

Lieutenant (j.g.) Robert F. Weir,  
USN; *B.S., U.S. Naval Academy.*

Lieutenant Donald R. Wheeler, USN;  
*B.S., U.S. Naval Academy.*

Associate Professor Jerome Williams;  
*B.S., University of Maryland; M.A.,  
The Johns Hopkins University.*

Lieutenant Commander Harold I.  
Winter, USN; *A.B., M.S., Univer-  
sity of Miami.*

Lieutenant (j.g.) Richard P. Zimmer-  
mann, USN; *B.S., U.S. Naval Acad-  
emy.*

## SCIENCE DEPARTMENT

**Head of Department:** Captain William C. Kistler, USN; B.S., U.S. Naval Academy; M.S.(E.E.), U.S. Naval Postgraduate School.

**Executive Officer:** Commander James J. Thompson, USN; B.S.E.-E., Pennsylvania State University; B.S.E.E., U.S. Naval Postgraduate School.

**Senior Professor:** Professor Edward J. Cook, B.Ch.E., M.S., University of Minnesota; Dr.Eng., Johns Hopkins University; P.E.

### *Departmental Staff:*

Associate Professor Virgilio Acosta; B.S., *Instituto de Santa Clara*; Doctor in Science, *University of Havana, Cuba*.

Professor Reuben E. Alley, Jr.; B.A., *University of Richmond*; E.E., Ph. D., *Princeton University*.

Lieutenant Grant S. Anderson, USNR; B.S., M.S., *Lehigh University*.

Professor Henry H. Baker; A.B., *Dartmouth College*; M.S., Ph. D., *New York University*.

Lieutenant Ronald C. Baker, USN; B.S., *U.S. Naval Academy*

Lieutenant Commander Peter S. Blair, USN; B.S., *U.S. Naval Academy*; B.S.(E.E.), *U.S. Naval Postgraduate School*.

Lieutenant Robert A. Bowman, USNR; B.S., M.S., *University of Illinois*.

Lieutenant (j.g.) Francis P. Box, USNR; B.S., M.S., *Georgia Institute of Technology*.

Assistant Professor Donald W. Brill; B.S., *Washington College*; M.S., *University of Delaware*.

Assistant Professor Stephen H. Burns; B.A., *Bowdoin College*; M.A., Ph. D., *Harvard University*.

Associate Professor Gerald P. Calame; B.A., *College of Wooster*; M.A.,

Ph. D., *Harvard University*.

Lieutenant Commander James R. Camper, USN; B.C.E., *University of Virginia*; B.S., *U.S. Naval Postgraduate School*.

Associate Professor R. Reece Corey, Jr.; B.S., *Washington College*; M.S., *University of Maryland*; Ph. D., *University of California (Davis)*.

Lieutenant Commander Eugene O. Dailey, USN; B.S., *South Dakota State College*; B.S., *U.S. Naval Postgraduate School*.

Professor John L. Daley; B.S., M.S., Ph. D., *Yale University*.

Lieutenant Robert S. Dalzell, USNR; B.S., M.B.A., *University of Pennsylvania*.

Lieutenant Edgar A. DeMeo, USNR; B.E.E., *Rensselaer Polytechnic Institute*; M.S., *Brown University*.

Ensign Michael G. Deverell, USNR; B.S., *Oregon State University*; M.B.A., *Northwestern University*.

Lieutenant Michael D. Duffy, USN; B.S., *Oregon State University*; B.S. (E.E.), *U.S. Naval Postgraduate School*.

Assistant Professor Francis J. Eberhardt; B.S., *University of Wisconsin*; M.S., *Catholic University of America*.

Professor Samuel A. Elder; B.S.,



- Hampden-Sydney College; Sc.M., Ph. D., Brown University.*
- Assistant Professor William E. Fasnacht; *B.S., Oregon State College.*
- Lieutenant Eugene P. Feist, USN; *B.A., Minot State College; M.S., U.S. Naval Postgraduate School.*
- Lieutenant Commander Frederick M. Fleeman, USN; *B.S., U.S. Naval Academy.*
- Associate Professor Charles A. Fowler, III; *B.S., U.S. Naval Academy; M.S., University of Wyoming.*
- Major Phillip B. Friedrichs, USMC; *B.S., U.S. Naval Academy; M.S., (E.E.), U.S. Naval Postgraduate School*
- Associate Professor Frank J. Gomba; *A.B., A.M., Montclair Teachers College (New Jersey).*
- Professor Ralph A. Goodwin; *A.B., Simpson; M.S., Ph. D., Iowa State College.*
- Associate Professor Billie J. Graham; *B.S., Hampden-Sydney College; M.S., University of Cincinnati.*
- Commander Webster Griffith, USN; *A.B., Princeton University; M.S., (E.E.), U.S. Naval Postgraduate School.*
- Lieutenant Morton D. P. Groves, USNR; *B.A., B.S.(E.E.), M.S.(E.E.), Ph. D., Rice University*
- Professor Graham D. Gutsche; *B.S., University of Colorado; M.S., University of Minnesota; Ph. D., Catholic University of America.*
- Associate Professor Edgar D. Hall; *B.S., Parsons College; M.S., Catholic University of America.*
- Associate Professor Donald L. Hathway; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School; Oak Ridge School of Reactor Technology.*
- Commander David R. Hendrick, USN; *B.S., University of Missouri;*
- B.S.(E.E.), U.S. Naval Postgraduate School.*
- Assistant Professor John Dale Hollabaugh; *B.S., U.S. Naval Academy; M.S.(E.E.), U.S. Naval Postgraduate School*
- Commander Frederick B. Hollick, USN; *B.S., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.*
- Instructor Joseph F. Hollywood, Jr.; *B.A., St. Johns College (Annapolis)*
- Lieutenant Granville J. Hopkins, USN; *B.A., U.S. Naval Academy; B.S., U.S. Naval Postgraduate School.*
- Lieutenant Commander Richard P. Inman, USN; *B.S., U.S. Naval Academy; M.S.(E.E.), U.S. Naval Postgraduate School*
- Lieutenant Commander George J. Jenkins, Jr., USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*
- Assistant Professor Richard L. Johnston; *B.S., Carnegie Institute of Technology; M.S., University of Maryland.*
- Assistant Professor Owen L. Jones; *A.B., Drew University; M.S., Ph. D., West Virginia University.*
- Associate Professor Wesley K. Kay; *B.S.(E.E.), Tufts University; M.S. (E.E.), University of Kentucky.*
- Professor John F. Kelley, Jr.; *B.S., M.S., Boston College; Ph. D., Georgetown University.*
- Associate Professor Joseph H. Klein; *B.S., Baldwin-Wallace College; M.S., University of Alabama.*
- Associate Professor Edward Koubek; *B.S., State University of New York; Ph. D., Brown University.*
- Associate Professor S. Edward Krikorian, Jr.; *Sc.B., Brown University; Ph. D., Massachusetts Institute of Technology.*

Lieutenant Commander John F. Kropf, USN; *B.S.(E.E.), University of Washington; M.S.(E.E.), U.S. Naval Postgraduate School*

Assistant Professor Frank P. Kuhl, Jr.; *B.S., M.S., Columbia University; M.Eng., D.Eng., Yale University.*

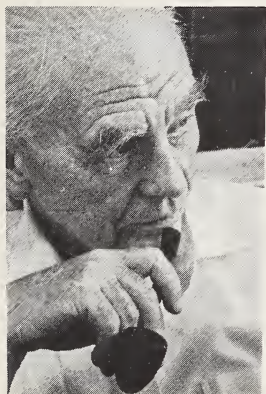
Professor John A. Lee, Jr.; *B.C.E., Rensselaer Polytechnic Institute; M.C.E., New York University.*

*Northeastern University; S.M., S.D., Harvard University.*

Lieutenant Walter A. Mason, Jr., USNR; *B.S., M.S., Kansas State College of Pittsburg.*

Professor Samuel P. Massie, Jr.; *B.S., Agricultural, Mechanical & Normal College (Pine Bluff, Arkansas); M.A., Fisk University; Ph. D., Iowa State University.*

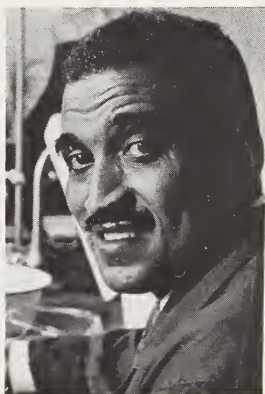
Lieutenant Thomas D. Mathews,



Prof. Pinkston



Cdr Bortner



Prof. Massie

Professor Glenn E. Leydorf; *B. Engr., University of Toledo; M.S., University of Maryland.*

Lieutenant Douglas H. Loescher, USNR; *B.S.(E.E.), Massachusetts Institute of Technology; M.S.(E.E.), Ph. D., Stanford University.*

Lieutenant Ronald R. Loose, USNR; *B.A., Wesleyan University; M.S., Ohio State University.*

Lieutenant Jerry L. Macon, USNR; *B.S., Colorado College; M.S., Massachusetts Institute of Technology.*

Lieutenant Joseph W. Mader, USN; *A.B., San Diego State; B.S., U.S. Naval Postgraduate School.*

Professor Henry F. Maling, Jr.; *B.S.,*

*USNR; B.S., College of Charleston.*

Captain Jason F. Mayhew, USAF; *B.S., U.S. Naval Academy; M.S., Southern Methodist University.*

Lieutenant David S. McCaffrey, Jr., USNR; *B.S., University of Notre Dame.*

Lieutenant Commander Patrick C. McKinnon, USN; *B.S., St. Mary's College, California.*

Lieutenant Robert O. Meyers, USN; *B.S., Illinois Institute of Technology; M.S., University of Illinois.*

Associate Professor Frank L. Miller; *B.S., M.S., Ph. D., University of Oklahoma.*

Associate Professor Bruce H. Morgan; *A.B., Harvard University; M.S., California Institute of Technology.*

Associate Professor Herbert M. Neustadt, Jr.; *B.S., Massachusetts Institute of Technology; M.S., The Johns Hopkins University.*

Associate Professor John D. Nixon; *B.Sc., Manchester University, England; M.A., Wesleyan University (England); Ph. D., Reading University (England).*

Lieutenant Commander Verne G. Nomady, USN; *B.S., U.S. Naval Academy; M.S., Carnegie Institute of Technology.*

Associate Professor David A. Nordling; *B.A., Georgetown College (Kentucky); M.S., Catholic University of America.*

Associate Professor William F. O'Hara; *B.S., Clarkson College (Potsdam, N.Y.); Ph. D., University of Virginia.*

Associate Professor Morris M. Oldham; *B.A., College of Wooster; M.S., University of Michigan.*

Commander William R. Overdorff, USN; *B.S., U.S. Naval Academy; B.S.(A.E.), U.S. Naval Postgraduate Schools; M.S., Massachusetts Institute of Technology.*

Commander Julian C. Patrick, USN; *B.S., U.S. Naval Academy; M.S.(E.E.), U.S. Naval Postgraduate School*

Commander Lee R. Patterson, USN; *B.S., U.S. Naval Academy; M.S., U.S. Naval Postgraduate School.*

Lieutenant Commander Lyle E. Pellock, USN; *B.S.(E.E.), Illinois Institute of Technology.*

Associate Professor W. Donald Pennington; *B.Ch.E., The Johns Hopkins University.*

Professor Earl R. Pinkston; *B.S., U.S. Naval Academy; M.S., Catholic*

*University of America.*

Assistant Professor John V. Prestia; *B.S., University of Virginia; M.S., Georgetown University.*

Lieutenant Carl A. Rapp, SC, USNR; *B.S., Bates College (Maine); M.B.A., Rutgers University.*

Associate Professor Charles W. Rector; *Ph. B., S.B., University of Chicago; M.S., Franklin and Marshall College; Ph. D., Johns Hopkins University.*

Commander Richard W. Reed, USN; *B.S., Auburn University; M.A., University of Texas.*

Associate Professor Robert R. Ressler; *B.S., M.S., Lehigh University.*

Commander Grady H. Roby, USN; *B.S., U.S. Naval Academy; B.S.(A.E.), U.S. Naval Postgraduate School.*

Professor Orville W. Rollins; *B.S., M.S., West Virginia University; Ph. D., Georgetown University.*

Lieutenant Henry F. Russell, USNR; *B.S., M.S., University of Delaware.*

Assistant Professor Ralph P. Santoro; *B.S., M.S., Ph. D., Massachusetts Institute of Technology.*

Associate Professor Leslie R. Schweizer; *A.B., Gettysburg College; M.S., Virginia Polytechnic Institute.*

Lieutenant Commander Edward A. Sechrest, USN; *B.S., U.S. Naval Academy; B.S.(E.E.), U.S. Naval Postgraduate School; M.S., George Washington University.*

Lieutenant (j.g.) James P. Segerstrom, USNR; *B.S., Wisconsin State University.*

Professor Donald G. Sheets; *A.B., Central College (Fayette, Mo.); M.S., Ph. D., University of Michigan.*

Assistant Professor Robert N. Shelby; *B.S., M.A., University of Texas.*

Lieutenant Terry A. Shepherd,



USNR; *B.S., Pennsylvania State University; B.S.(E.E.), U.S. Naval Postgraduate School.*

Lieutenant Colonel Eugene E. Shoults, USMC; *B.A., Vanderbilt University; M.S., U.S. Naval Postgraduate School.*

Lieutenant Colonel John D. Shoup, USMC; *B.S., University of California; B.S.(E.E.), U.S. Naval Postgraduate School.*

Professor William M. Smedley; *B.S., M.S., Northwestern University.*

Lieutenant Ted P. Smith, USNR; *B.E.E., Georgia Tech.; M.B.A., Indiana University.*

Professor John R. Smithson; *B.S., Washington College; M.S., Indiana University; Ph. D., Catholic University of America.*

Lieutenant Christopher R. Thomas, USN; *B.S., U.S. Naval Academy; B.S.(E.E.), U.S. Naval Postgraduate School.*

Associate Professor J. Curtis Thompson; *B.S., U.S. Naval Academy; M.S.(E.E.), Catholic University of America.*

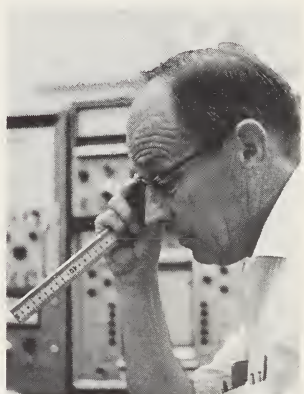
Assistant Professor Donald J. Treacy; *B.S., Boston College; M.A., Ph. D., Princeton University.*

Lieutenant Anton F. Vierling, USNR; *B.S., University of Notre Dame; M.S., University of Connecticut; M.S., Harvard University.*

Lieutenant (j.g.) Walton G. Warner, USNR; *B.S., University of Minnesota.*

Professor Joseph R. Wiebush; *B.S., Franklin Marshall College; M.S., Ph. D., University of Maryland.*

Lieutenant (j.g.) Frederick C. Williams, Jr., USNR; *B.S., Boston College; M.S., Ph. D., University of North Carolina.*



Prof. Goodwin

Commander Franklin T. Woodall, Jr., USN; *B.S.(E.E.), University of Texas; M.S.(E.E.), U.S. Naval Postgraduate School.*

Associate Professor John G. Zimmerman; *B.S., M.S., University of Pennsylvania.*

## WEAPONS DEPARTMENT

**Head of Department:** Captain William K. Doty, USN; *B.S., U.S. Naval Academy; M.S., Purdue University; Air War College.*

**Executive Officer:** Commander George C. Sup, USN; *B.S., U.S. Naval Postgraduate School.*

**Academic Advisor:** Associate Professor John W. Neil; *B.S., State Teachers College, California, Pennsylvania; Ed.M., University of Pittsburgh.*

### *Departmental Staff:*

Commander Gene T. Allender, USN;  
*B.S., U.S. Naval Academy; M.S.E.E.,  
U.S. Naval Postgraduate School.*

Major Leroy A. Bickley, USMC; *B.S.,  
U.S. Naval Academy; B.S.E.E., U.S.  
Naval Postgraduate School.*

Lieutenant Commander Albert A.  
Carretta, Jr., USN; *B.S., U.S. Naval  
Academy; M.S., U.S. Naval Post-  
graduate School.*



Asst. Prof. Olsen

Associate Professor Peter Dransfield;  
*B.E., University of New South  
Wales (Australia), M.E., Sydney  
Technical College; Ph. D., Univer-  
sity of Salford (England).*

Commander Charles G. Erb, USN;  
*B.S.A.E., U.S. Naval Postgraduate  
School; M.S.A.E., Massachusetts In-  
stitute of Technology.*

Major Roy M. Gulick, Jr., USMC;  
*B.S., U.S. Naval Academy; B.S.E.E.,  
U.S. Naval Postgraduate School.*

Associate Professor Donald F. Haber;  
*B.S., M.S., University of Missouri;  
Ph. D., Oklahoma State University.*

Lieutenant Commander Wayne J.  
Haley, USN; *B.S., U.S. Naval Acad-  
emy; B.S., U.S. Naval P.G. School.*

Lieutenant Robert P. Hardison, Jr.,  
USN; *B.S., U.S. Naval Academy;  
B.S.E.E., U.S. Naval Postgraduate  
School.*

Associate Professor John F. Hoffman;  
*B.C.E., Cooper Union; M.C.E.,  
Polytechnic Institute of Brooklyn;  
P.E.*

Commander Mark B. Lechleiter,  
USN; *B.S., U.S. Naval Academy;  
U.S. Naval Postgraduate School.*

Lieutenant Jon R. Lund, USN; *B.A.  
Chem., Concordia College; B.S.E.E.,  
U.S. Naval Postgraduate School.*

Lieutenant Commander Edward J.  
Mahon, Jr., USN; *B.S., U.S. Naval  
Academy; B.S.Phys., U.S. Naval  
Postgraduate School.*

Lieutenant Donald R. May, USNR;  
*B.S., Illinois College; B.S., U.S.  
Naval Postgraduate School.*

Lieutenant Peter L. McCammon,  
USN; *B.S., U.S. Naval Academy;  
B.S.E.E., U.S. Naval Postgraduate  
School.*

Lieutenant Commander Lawrence E.  
McCullough, USN; *B.S., U.S. Naval  
Academy; M.S.E.E., U.S. Naval  
Postgraduate School.*

Assistant Professor Charles F. Olsen;  
*B.S., U.S. Naval Academy; M.S.E.,  
The George Washington Univer-  
sity.*

Commander Willard R. Olson, USN;  
*B.S. U.S. Naval Academy; B.S.E.E.,  
U.S. Naval Postgraduate School.*

Lieutenant Commander Kenneth F.  
Robinson, USN; *B.S., B.S.E.E.,  
U.S. Naval Postgraduate School;  
M.S.I.A., The George Washington  
University.*

Major Torrence W. Rogers, USMC;  
*B.S., U.S. Naval Academy; B.S.E.E.,  
U.S. Naval Postgraduate School.*

Lieutenant Richard W. Seiler, USN;  
*B.S.E.E., Bradley University; M.S.  
E.E., U.S. Naval P.G. School.*

Lieutenant Reece W. Steiner, USNR;  
*B.S., Michigan College of Mining  
and Technology; B.S., U.S. Naval  
Postgraduate School.*

Major William J. Tirschfield, USMC;  
*B.S., U.S. Naval Academy; B.S.E.E.,  
U.S. Naval Postgraduate School.*

Lieutenant Commander Arthur B.  
Trammell, USN; *B.S., U.S. Naval  
Academy; B.S.E.E., U.S. Naval  
Postgraduate School.*

Lieutenant Commander Samuel B.  
Walker, USN; *B.S., U.S. Naval  
Academy; M.S.E.E., U.S. Naval  
Postgraduate School.*

Professor Edwin J. Waller; *B.S., M.S.,  
Oklahoma State University; Engr.  
E.M., Stanford University; Ph. D.,  
Oklahoma State University.*

Lieutenant Commander Walter J.  
Wysocki, USN (Ret.); *B.S., The  
Johns Hopkins University; U.S.  
Naval Postgraduate School.*

## DIRECTOR OF ATHLETICS

**Director:** Captain John O. Coppedge, USN; *B.S., U.S. Naval  
Academy; M.A., The George Washington University; U.S. Naval  
War College.*

**Assistant Director:** Mr. Edgar E. Miller; *B.S., University of Notre  
Dame.*

### *Athletic Association Coaches*

Mr. Alexander C. Campbell; *B.S.,  
University of Miami.*

Mr. Lee R. Corso; *B.S., M.S., Florida  
State University.*

Mr. H. Richard Duden, Jr.; *B.S.,  
U.S. Naval Academy.*

Mr. William T. Elias; *B.S., M.Ed.,  
University of Maryland.*

Mr. Louis W. Gellermann; *B.S., Uni-  
versity of Washington.*

Mr. John J. Hyder; *B.S., University  
of Cincinnati.*

Mr. Joseph J. C. Mark; *B.S., M.S.,  
College of William & Mary.*

Mr. Don L. Ross; *B.S., M.Ed., Texas  
Christian University.*

Mr. Carl W. Schuette; *B.A., Mar-  
quette University.*

Mr. William P. Templin; *B.S., Pur-  
due University.*

Mr. James T. Todd; *B.S., M.S., Uni-  
versity of Virginia.*

Mr. J. Robert Williams.





## Prizes and Awards

Each June Week more than 80 prizes and awards, provided by individuals and a wide variety of organizations, are presented to midshipmen in recognition of their noteworthy accomplishments in such areas as academics, leadership, professional studies, debate, public speaking, sailing, marksmanship, and athletics.



## The Museum

The Naval Academy Museum serves as inspiration to the men of the Brigade by providing tangible evidence of some of the most glorious episodes in our Nation's history. Its collection of more than 50,000 individual items also provides an important reference source for the teaching of naval history.

While most of the Museum's valuable collections are located within the Museum, other items of exceptional interest and value are located in the Chapel, Memorial Hall, the Library, and in other buildings throughout the Academy. The Museum contains some of the finest ship models in the world, including many from the

famous Rogers Collection, a superb collection of 13 maritime paintings by Edward Moran, perhaps the largest collection in the world of items relating to the life and work of John Paul Jones, the table from the mess deck of the battleship *Missouri* on which was signed the instrument of surrender ending World War II, and literally thousands of other significant items relating to the history of our Navy and of the Naval Academy. In addition, the Museum has valuable collections of manuscripts and extensive photographic files.



Museum items in Bancroft Hall include the flag hoisted by Commodore Oliver Hazard Perry at the Battle of Lake Erie on which were emblazoned the immortal words of the dying James Lawrence, "Don't Give Up The Ship!"; the original marble bust of John Paul Jones by Jean Antonine Haudon; and fine portraits of distinguished naval officers. In the Chapel Crypt will be found John Paul Jones' commission as a captain, signed by John Hancock, his membership certificate in the Society of the Cincinnati, signed by George Washington, and the dress sword presented to him by King Louis XVI. The Library contains a number of ship models from the Rogers Collection and numerous historic flags, including the only known captured British Royal Standard.

## The U.S. Naval Academy Alumni Association

The U.S. Naval Academy Alumni Association, Inc., is a private organization whose mission is to serve and support the United States, the Naval Service, and the Naval Academy by furthering the



*Alumni House*

highest standards of the Naval Academy; by seeking out, informing, encouraging, and assisting outstandingly qualified young men to pursue careers in the Navy and Marine Corps through the Naval Academy; and by initiating and sponsoring activities which will perpetuate the history, traditions, memories, and growth of the Naval Academy and bind alumni together in support of the highest ideals of command, citizenship, and government.

All alumni of the Naval Academy are eligible for membership in the Association—graduates, nongraduates, active duty officers, retired officers, and resigned alumni.

Alumni House (Ogle Hall of pre-Revolutionary Annapolis fame)



is the Association's distinguished national headquarters. Files and records are maintained on all ex-plebes dating from the establishment of the present Naval Academy in 1845 through the classes now enrolled. The many functions of the Association include annual publication of the *Register of Alumni*, publication of *Shipmate*, the alumni magazine, support of class and chapter organizations, and direct and indirect service and support of many activities at the Academy throughout the year.

## The United States Naval Institute

Headquartered in Annapolis, the United States Naval Institute is a voluntary, private, nonprofit association of more than 56,000 members formed in 1873 for "the advancement of professional, literary, and scientific knowledge in the Navy." The membership includes officers and enlisted personnel from all branches of the military services, distinguished officers of foreign navies, and U.S. citizens interested in American seapower. Members pay annual dues which entitle them to a year's subscription to the Institute's monthly professional journal, *The United States Naval Institute Proceedings*, one of the most widely quoted and reprinted journals in the United States.

In addition to the *Proceedings*, the Institute publishes a large variety of books, including works on naval history and biographies of naval heroes as well as texts on professional naval subjects.



## CALENDAR

### 1968

23-25 August	Parents' Open House, Class of 1972.
Monday, 2 September	Labor Day, Holiday.
Wednesday, 4 September	Leave and summer training expire for First, Second, and Third Classes.
Saturday, 7 September	First Semester recitations begin.
6-8 November	Mid-Semester Examinations.
Monday, 11 November	Veterans' Day, Holiday.
18-25 November	Registration for Second Semester.
Thursday, 28 November	Thanksgiving Day, Holiday.
Wednesday, 11 December	Graduate Record Examination, First Class.
Saturday, 21 December	Christmas Leave begins.

### 1969

Sunday, 5 January	Christmas Leave ends.
17-24 January	Examinations.
24-26 January	Leave.
Monday, 27 January	Second Semester begins.
Friday, 21 February	Holiday.
Saturday, 22 February	Washington's Birthday, Holiday.
17-19 March	Mid-Semester Examinations.
19-23 March	Spring leave.
Friday, 4 April	Good Friday (no afternoon classes).
Sunday, 6 April	Easter Sunday.
14-21 April	Registration, First Semester 1969-70.
16-24 May	Examinations.
Thursday, 29 May	June Week begins.
Friday, 30 May	Memorial Day, Holiday.
Wednesday, 4 June	Graduation.
Wednesday, 25 June	Class of 1973 enters.

# INDEX





Academic Advisory Board, 3, 223  
 Academic Computer Center, 74  
 Academic Dean, 5, 62, 221, 225, 232  
 Academic Departments and Programs, 105  
 Academic Organization, 62  
 Academic Program, 59  
 Accreditation, 1, 59  
 Administration, 221  
 Advanced Placement Program, 67  
 Alternates, Appointment, 13  
 Alumni Association, 260  
 American Republics, Appointment, 14  
 Application, Congressional Nomination, 10, 16  
 Application, Presidential Nomination, 11, 17  
 Application, Son of Deceased Disabled Veteran Nomination, 12, 15, 18  
 Appointment, 10  
 At-Sea Training, 89, 90, 197, 200, 201  
 Athletic Association, 211  
 Athletic Program, 205  
 Athletics, Intercollegiate, 206  
 Awards, 258  
 Bancroft Hall, 7, 79, 95, 99  
 Basic Curriculum, 59, 60  
 Board of Visitors, 2, 221  
 Brigade and Military Program, 80  
 Calendar, 262  
 Canal Zone Nominations, 10, 15  
 Career, Naval Officer's, 49  
 Chapel, 97  
 Chemistry Laboratories, 174  
 CIC Training Rooms, 160  
 Civil Service Examination, 15  
 College Certificate Method, 22  
 College Entrance Examination Board Tests, 20  
 Competitive Nominating Method, 14  
 Computing Center, Academic, 74  
 Commandant of Midshipmen, 79, 197, 221, 225, 228  
 Congressional Nominating Methods, 14  
 Congressional Nominations, 10  
 Core Curriculum and Minor, 5, 59  
 Courses, Engineering, 111  
 Courses, English, History and Government, 126  
 Courses, Modern Languages, 150  
 Courses, Mathematics, 143  
 Courses, Naval Science, 165  
 Courses, Professional Training, 198  
 Courses, Science, 177  
 Courses, Weapons, 190  
 Curriculum Changes, Recent, 5  
 Debate Tournament, Invitational, 73  
 Degree Requirements, 69  
 Dental Facilities, 95  
 Dental Standards, 30  
 Deposit, Entrance, 38  
 Director of Athletics, 225, 257  
 Directory, Staff and Faculty, 225  
 District of Columbia Nominations, 10  
 Early Notification of Admission, 34  
 Electrical and Electronic Laboratories, 172  
 Eligibility Requirements, General, 9  
 Engineering Department, 106, 234  
 English, History, and Government Department, 122, 238  
 Entrance Information and Procedures, 9, 35  
 Evening Lecture Program, 71  
 Examination Method, 20  
 Executive Department, 79, 228  
 Extracurricular Program, 213  
 Eye Examination, 28  
 Facilities, 5, 95  
 Faculty, 1, 62  
 Finances, 39  
 First Class Year, 90, 201  
 First Duty, 50  
 Foreign Affairs Conference, 4, 72  
 Modern Languages Department, 148, 245  
 Foreign Students, 14, 43  
 Former Midshipmen, 24  
 Grading, 65  
 Graduate Study, 56, 71  
 Guam, Nominations, 10 15  
 History, Naval Academy, 1  
 Honor Concept, 80  
 Honor Naval/Military School, 12  
 Nominations, 10  
 Important Dates, Candidates, 47  
 Invitational Debate Tournament, 73

Laboratories, Engineering, 107  
 Laboratories, Languages, 148  
 Laboratories, Naval Science, 160  
 Laboratories, Science, 172  
 Laboratories, Weapons, 188  
 Language Laboratories, 148  
 Leaders, Development, 86  
 Leave and Privileges, 92  
 Library, Brigade, 74  
 Library, Naval Academy, 73  
 Mathematics Department, 140, 242  
 Medical, Dental, Hospital Services, 95  
 Medical Examination Considerations, 27  
 Medical Examining Center Facilities, 31  
 Medical Qualification, 24  
 Michelson Hall, 3, 7  
 Minors and Majors Program, 68  
 Museum, 258  
 Naval Hygiene, 89  
 Naval Institute, 261  
 Naval Officer's Career, 49  
 Naval Science Department, 159, 247  
 Nominating Schedule, 15  
 Nominations, 10  
 NROTC Nominations, 12  
 Oath of Office, 37  
 Officer Career Patterns, 50  
 Officer Education and Training, 54  
 Officer, First Duty, 50  
 Philippines, Appointment, 14  
 Physical Education, 93, 202, 230  
 Physical Examination, 24  
 Physics Laboratories, 173  
 Planetarium, 160  
 Plebe Indoctrination, 83  
 Plebe year, 83, 86, 198  
 Prayer, Midshipman's, 98  
 Preparatory Scholarships, 45  
 Presidential Nominations, 11  
 Principal-Alternate Nominations, 14  
 Prizes, 258  
 Professional Training Program, 85, 183  
 Professors Emeriti, 234  
 Puerto Rico, Nominations, 10, 15  
 Qualifications Progress Reports, 34  
 Regular Navy/Marine Corps Nominations, 11  
 Religious Activities, 97  
 Reserve Navy/Marine Corps Nominations, 11  
 Reveille, 85  
 Rhodes Scholarships, 4, 55  
 Sailing, 215  
 Samoan Nominations, 10, 15  
 Schedule of Instruction, 65  
 Scholarships, 4, 45, 55  
 Scholastic Records, 19  
 Scholastic Requirements, 19  
 Science Department, 171, 251  
 Second Class Year, 89, 201  
 Service Obligation, 41  
 Ship Hydromechanics Laboratory, 107  
 Sons of Deceased or Disabled Veterans, Nominations, 12, 15  
 Sons of Medal of Honor Winners, Nominations, 13  
 Sources of Nominations, 10  
 Sports, 205  
 Staff and Faculty, 225  
 Superintendent, 1, 62, 221, 225  
 Tape Recording Studio, 148  
 Taps, 85  
 Third Class Year, 88, 200  
 Trident Scholars, 5, 70  
 Vice Presidential, Nominations, 10  
 Virgin Islands, Nominations, 10, 15  
 Weapons Department, 188, 255  
 Weekends, 93  
 Weekly Routine, 85  
 Weight Standards, 27  
 Wind Tunnel, 107  
 Yard Patrol Squadron, 160, 219

This catalog should not be considered a contract between the U.S. Naval Academy and any prospective candidate. The curriculum and policies are subject to change to meet varying requirements of the Navy.







*Graduation—  
an end  
and a beginning*



## Photography

**Robert de Gast:** viii, 8, 23, 58, 64, 70, 74, 76, 81, 101 (center right), 102 (lower left), 103 (top), 111, 114, 137, 142, 145 (bottom), 163 (top), 164, 169, 183, 184, 187, 194, 203, 214, 233, 237; **Jack Engeman:** 83, 113; **Ed Holm:** 48; **Sam Lango:** 6 (bottom); **Marion Warren:** 35, 75, 96, 101 (left), 128, 131, 147, 180, 191, 216 (bottom), 220, 224 (right), 239 (left & right), 243 (left), 249 (center & right), 266; **Lucky Bag:** 66, 100 (top), 145 (top), 170, 204; **USNA Alumni Assn:** 260; **U.S. Naval Institute:** 6 (top & center); **U.S. Navy . . . Midshipman M. Duncan:** 209 (lower right); **Norman Goldberg:** 13, 36, 63, 78, 87, 90, 94, 98, 100 (lower left & right), 101 (top & bottom), 102 (top), 103 (top right & bottom), 104, 119, 124, 151, 153 (top), 156, 163 (bottom), 173, 199 (top & bottom), 200, 209 (top), 210 (lower left), 212, 216 (top), 224 (center), 229, 231, 235 (all), 255, 259; **Jerry Means, PHC:** 192, 196; **Robert Moesser:** 51 (both), 52 (bottom); **Jack Moore:** Cover, ii, 88, 178, 208 (left), 209 (top right); **Howard Porter, PH3:** 243 (center & right), 246 (right), 249 (left), 256; **Frank Travis, PH1:** 224 (top); **C. W. Wloszek:** 208 (top); **Identity of Navy Photographer not known:** iv, 4, 46, 52 (top), 54, 69, 73, 84, 92, 102 (center), 103 (lower right), 120, 138, 153 (bottom), 208 (bottom), 209 (lower left), 210 (top three), 218, 224 (left), 258.











# UNITED STATES NAVAL ACADEMY

1. FIELD HOUSE
2. ENLISTED MEN'S BARRACKS
3. WARD HALL
4. DAHLGREN HALL
5. BANCROFT HALL
  - 5a. ROTUNDA AND MEMORIAL HALL
  - 5b. MESS HALL
  - 5c. LIBRARY-ASSEMBLY AREA
  - 5d. EIGHT DORMITORY WINGS
6. MacDONOUGH HALL
7. LUCE HALL
8. MICHELSON HALL
8. CHAUVENET HALL
9. LIBRARY (COMPLETION: 1972)
10. MAHAN HALL (LIBRARY)
11. MAURY HALL
12. SAMPSON HALL
13. ISHERWOOD HALL
14. GRIFFIN HALL
15. MELVILLE HALL
16. MUSEUM
17. MODERN LANGUAGES BUILDING
18. OFFICERS/FACULTY CLUB
19. ADMINISTRATION BUILDING
20. CHAPEL
21. SUPERINTENDENT'S HOUSE
22. OFFICERS HOUSING
23. HUBBARD HALL
24. ALUMNI HOUSE
25. CHASE-LLOYD HOUSE
26. HAMMOND-HARWOOD HOUSE
27. ST. ANNE'S CHURCH



DEPARTMENT OF THE NAVY

U.S. NAVAL ACADEMY

Superintendent's Office  
Annapolis, Maryland 21402

OFFICIAL BUSINESS



POSTAGE AND FEES PAID  
DEPARTMENT OF THE NAVY

